Sketch for a Systematic Metaphysics

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For Jenny

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Preface

In 2008 I was asked to give a course in metaphysics at the Graduate Center of the City University of New York (CUNY). I was uncertain what to base the course on. I had previously, in 2005, given a course there based on my book *Truth and Truthmakers* (Armstrong 2004) and it seemed that I should not repeat that. But what should I substitute? The following idea came to me. The years when analytic philosophy was dominated first by the ideas of the logical positivists and then by the 'ordinary language' approach that became fashionable in Oxford were thankfully long gone. Gone also were the objections that were made to traditional metaphysics by these philosophers. Metaphysics is now respectable again. But, it seems, metaphysics, though pursued by many very talented philosophers, is at present done in a rather piecemeal way. It is rare to find a systematic approach to the subject. But, I thought, I do have something that may be called a metaphysical system. Why should I not present it to my seminar?

A text I wrote out for the CUNY lectures served as a first draft for this not very long sketch of my metaphysics. I did present my system some years ago in *A World of States of Affairs* (Armstrong 1997a). More recently Stephen Mumford published a book *David Armstrong* in a series Philosophy Now, which I think is excellent (Mumford 2007). It does not confine itself to my metaphysics, though metaphysics gets the most space.

My views, however, though their general direction is the same, have been revised in certain places. In particular, it is only relatively recently that I have realized just how important is the notion of a *truthmaker* for tying up many issues. Again, I have, after a good deal of chopping and changing, reached a new view of the 'fundamental tie' between particulars and universals. The 1997 book, furthermore, was very much a work for professionals. I found that I wanted to write something deliberately directed towards students, graduate students, and even undergraduates, and perhaps even towards the general educated reader with an interest in philosophy. So some things are explained here which the working philosopher will not need to have explained.

We learn by teaching, as a Latin proverb has it, and, not surprisingly, the explaining I do in this sketch has in turn helped to modify some of my views a little further. At the same time, I have given all the references that are required by academic convention, including introducing some footnotes that, however, may be safely skipped.

I'd like to emphasize, cannot indeed overemphasize, the tentative nature of what I present here. Philosophers may not like to admit it, but fashion is an important factor in philosophy. And once fashion comes in, objectivity goes. The reason is rather obvious: philosophy lacks the wonderful *decision procedures* that are present in logic and mathematics (proofs) and the natural sciences (observation and experiment, together with mathematics). Unfortunately there seems to be no remedy for this situation, and those who thought there is a remedy, such as the logical positivists, learnt bitter lessons. But since this is so, we philosophers should be appropriately modest.

I've adopted a reasonably colloquial style, as though these are lectures. My own introduction to metaphysics was through attending dictated lectures by John Anderson during 1949 and 1950, then Challis Professor of Philosophy at the University of Sydney. The subject was said to be the book *Space, Time and Deity* by Samuel Alexander, being the Gifford Lectures given at Glasgow, 1916–1918. Anderson had heard these lectures while a student at Glasgow University, and, while a senior student, had discussions with the affable Alexander.[1] Anderson took a few leading ideas from Alexander, but primarily the objective was to present, via criticism of Alexander, Anderson's own metaphysics. These lectures have been salvaged and put together as a book, edited by Creagh Cole with an Introduction by myself: *Space, Time and the Categories* (2007). Anderson's scheme of metaphysical categories, where he followed in a tradition set by Plato, Aristotle, Kant, Hegel, and Samuel Alexander, is of some interest, I think.

Two other persons had a major influence on my thinking about metaphysics. One was C.B. (Charlie) Martin who introduced me to the all-important notion of a truthmaker. A second was David Lewis. Lewis and I had many disagreements about metaphysics. I do not accept his view that all the possible worlds really exist. I reject his account of laws of nature as mere regularities in the world, and also his account of causality in terms of counterfactuals – that is, in terms of what would have happened in the absence of the cause. But again and again discussions with him were fruitful, even where we disagreed, and he taught me much. James Franklin,

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[1] For an interesting life of John Anderson see *A Passion to Oppose*, by Brian Kennedy, a historian.

Anne Newstead, and I have worked together recently, our aim being to produce elements of an 'Aristotelian' philosophy of mathematics, work reflected in this book. Jacob Berger and Dan Shargel made excellent contributions to the 2008 seminars, contributions acknowledged in the text. Jim Durham, Bob Fry, and Joan Symington are not philosophers but do have an educated interest in the subject. I thank them for reading the manuscript and giving me valuable comments. Noa Latham and Gonzalo Rodriguez-Pereyra also read the text and made very helpful suggestions.

There are 16 chapters, which may seem an excessive number for a short work. But philosophy is often best digested if you take small bites.

Chapter 1

Introduction

I begin with the assumption that all that exists is the space-time world, the physical world as we say. What argument is offered for this assumption? All I can say is that this is a position that many – philosophers and others – would accept. Think of it this way. This is a *hypothesis* that many would accept as plausible. The space-time entity seems obviously to exist. Other suggested beings seem much more hypothetical. So let us start from this position and see if a coherent metaphysical scheme, one that gives a plausible answer to many of the great problems of metaphysics, can be erected on this relatively narrow foundation. After all, it is folly to think that, by philosophical reasoning, one can *prove* that any particular scheme of ontology (another term for metaphysics, but one that tends to concentrate on the general nature of things) is correct. What we can hope for is a vision (hopefully coherent) of the fundamental structure of the world, a vision that will then compete with other visions. I argue where I can, but at times I simply assert.

The restriction of what there is to space-time means the rejection of what many contemporary philosophers call 'abstract objects', meaning such things as numbers or the Platonic Forms or classes, where these are supposed to exist 'outside of' or 'extra to' space-time. The phrase 'abstract

objects' originates with W.V. Quine[1] but it involves a rather extraordinary use of the word 'abstract'. One quite strong argument against these so-called 'abstract entities' is that it is hard to see what *causal role* such beings would play. And if they play no causal role it is hard to see how we can have good reasons for thinking they exist. The thought that the entities we postulate should have causal roles was formalized by Graham Oddie (1982). He christened it the Eleatic Principle.[2] Note that the phrase 'causal roles' allows us to think that different sorts of entity may play different sorts of causal role. But if an entity plays no causal role at all, then that is a good argument, though perhaps not a conclusive one, for not postulating that entity.

I say that I restrict being, what exists, to the space-time world. This is by no means to rule out an account of space-time which makes it very different from the relatively simple picture of a single three-dimensional space and an extra dimension of time which has a past, has a present, and advances inexorably into the future. Following the terminology introduced by the US philosopher Wilfrid Sellars we can call this the *manifest image*, the commonsense view, of space-time (Sellars 1968). It was the view held by scientists until the end of the 19th century. It was overthrown by Einstein's Special Relativity theory, which made the present into a relative notion, relative to the inertial system in which observations are made. There followed Einstein's General Relativity theory that introduced the distortion of space by matter, perhaps because matter *was* that distortion. Nowadays, for cosmologists

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[1] See for instance his essay 'On What There Is' in his book *From a Logical Point of View*, 1961.

[2] After the suggestion of the Eleatic Stranger in Plato's *Sophist* 247D–E. See also Armstrong 1997a, 3.82.

and quantum theorists the nature of space–time, the *scientific image* as Sellars would have said, is up for grabs and in many a theorist's mind it is utterly different from the manifest image. Philosophers, I take it, must just follow the lead of natural science here, and natural science has so far produced no generally agreed-upon theory.

But if we follow the lead of natural science why do we not foreclose any appeal to metaphysics? Why not just hand over the inquiry to science? The answer is that there are a great number of notions that, following the lead of Gilbert Ryle and J.J.C. (Jack) Smart, we can call *topic neutral* notions. Instances are cause, class, property, relation, quality, kind, resemblance, quantity, number, substance, fact, truth, law of nature, power, and others. These notions are perfectly general, are very difficult to analyse and interconnect, and give rise to controversy, sometimes to bitter controversy, when we (and the 'we' here includes scientists as much as philosophers) try to discuss them. They are not exhausted by logic or mathematics. It is these sorts of notions, I suggest, that metaphysics strives to give a systematic account of.

Let us take the topic of causation as an example. What is causation? Beyond the judgements of causation that ordinary life furnishes us with, pushing that cup caused it to fall and break, we look to empirical science to tell us what causes what. And science has amazingly enlarged our knowledge of what does cause what. Science has taught us that laws of nature in general take a mathematical form and, much more recently, that the data seem to show that the laws are probabilistic only, a difficult idea, and something we would not come to naturally. But what do philosophers say causation is? Here are some, *only some*, of the views. Some see it as no more than regularity in the way things happen,

echoing what may have been David Hume's view. But others think that it is a *making* things happen in the individual sequence, this bullet causing this death, with any regularities a secondary matter. David Lewis held that causality was a connection of events subject to the truth of a *counterfactual*: if the first event, the cause, had not occurred then neither would the second event, the effect, have occurred. Others hold that causings are manifestations of powers, where the powers *necessitate* the manifestation. Phil Dowe partly turns back to science, arguing that causality is the possession of a *conserved quantity* in interactions that makes a process a causal process (Dowe 2000). Philosophical analyses of causation, as you see from this selection, a selection only, can be widely different. Now surely this matter ought to be debated, and it is debated. It is a *philosophical* debate about the nature of causality. Science does not settle the matter, though we have noted that it makes a large contribution. To debate the matter is to engage in metaphysics. The same difficult situation can be reproduced for the other topic neutral notions mentioned above. Agreement about their nature, and how they are interrelated, is very hard to get.

C.B. Martin, in a book published shortly before his death, *The Mind in Nature*, makes the following suggestion:

Ontology sets out an even more abstract model of how the world is than theoretical physics, a model that has *placeholders* for scientific results and *excluders* for tempting confusions. Ontology and theoretical science can help one another along, we hope, with minimal harm.   (Martin 2008, p.42)

Martin's suggestion serves, I think, as a good charter for a metaphysics. Notice that Martin's word 'abstract' bears the traditional, not Quine's, meaning of the word. To abstract is

to concentrate on some feature of things to the exclusion of other features, in Martin's case the most general features of things. That is what we metaphysicians would like to do: to set out such a model for the general features of things. Quine, as noted above, takes an abstract object to be something outside space-time. The hypothesis of this book is that there are no such objects.

Chapter 2

Properties

Let us begin with *properties* of objects, such things as colours, shape, temperature, mass. They will lead us to *states of affairs*: entities that lie at the centre of my ontology. Russell and Wittgenstein called them *facts* and I am simply following in their footsteps with a difference in terminology. See Russell's *The Philosophy of Logical Atomism* (1918) and Wittgenstein's *Tractatus* (1922). Wittgenstein, in my view, was taking a lead from Russell, the greatest metaphysician of the 20th century.

It would seem natural to accept the existence of properties. Things are coloured in particular ways, they have different shapes and sizes, they are hot or cold or in between, they have different weights. Scientific investigation rapidly endorses classifying things by their properties. For instance, it takes the commonsense property of weight and develops the more sophisticated and important property of mass. You weigh less on the moon, but your mass does not change. At a deeper level it postulates the property of rest-mass, the mass a body has when it is at rest as opposed to what it has when it moves. A very large part of empirical science lies in uncovering the properties of things, an uncovering that has had prodigious success.

It is the case, nevertheless, that until rather recently many in the analytic tradition have been inclined to deny the existence of properties in the world, deny the existence of

properties *in re* in the Latin phrase that is often used. This position is traditionally called 'Nominalism', though the word sometimes bears other senses. We should therefore begin by giving this sceptical view some attention. There are various types of Nominalism: Predicate, Class, Resemblance, and what I call 'Ostrich' Nominalism. (See Armstrong 1989 for an introductory book on these issues.) Predicate Nominalists hold that properties are the mere shadows cast by predicates. (See John Searle 1969; he says: 'to put it briefly, universals [so-called] are parasitic on predicate expressions', p.120. Trying to solve metaphysical problems by 'semantic ascent', that is, by appealing to language, was typical of the period.) I hope we can pass this position by. A more interesting view is *Class* Nominalism. To have the property of whiteness is to be a member of the class of white things. This is a 'set-theoretical' treatment of properties. The really interesting question that then arises is whether *every* class of objects constitutes a property, even if it is a property that we have no name for, no use for, and no interest in. That would be a thoroughgoing Class Nominalism, but at the same time it is rather implausible. David Lewis held that view at one time; see his paper 'New Work for a Theory of Universals' (Lewis 1999). The first note of his paper credits me with changing his mind on this matter. He says that otherwise 'I might well have believed to this day that set theory applied to *possibilia* is all the theory of properties that anyone could ever need'.

Lewis speaks of 'possibilia' here instead of 'particulars' as one might expect because he holds that the beings of every possible world exist. In this paper Lewis also calls attention to Quine's equally strange view that to introduce classes is to Platonize (to postulate non-spatiotemporal entities such as Plato's Forms) and so to abandon Nominalism. This is

because Quine thought that classes are 'abstract entities', outside space-time. I see no reason to think that classes are abstract entities, provided their members exist. Then, I think, classes supervene on their members – that is to say, once you are given the members, their class adds nothing ontologically, is no addition of being.[1] So there is no threat from classes to a space-time ontology. But even if classes are 'abstract entities' outside space-time as Quine thought, a class theory of properties is still a Nominalism.

Let us agree, then, that some classes are better than others. We might call the better ones property classes. What analysis will the Class Nominalist give of such classes? One line to take is that the distinction is primitive. Some classes are better than others, and that is all that can be said. (Though the Class theorist would presumably allow distinctions in degree of betterness.) Lewis thought to the end of his life that this sort of Class Nominalism was an option – though he also thought *tropes* (to be discussed shortly) and *universals* were options also. He made no decision about which of the three views to back.

Here is an argument against the first view: that there are property classes, but their goodness is primitive, unanalysable. It is a *Euthyphro* dilemma, of the sort that we find in Plato's dialogue the *Euthyphro*. Does the individual member have the property F (whiteness say) *because* it is a member of the class of white things? Or is it a member of the class in virtue of what it is itself? (The original *Euthyphro* dilemma was: what makes an act a good act? Is it just because it is pleasing to the gods? Or is it pleasing to the gods in virtue of its intrinsically

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[1] Wade Martin has reminded me about the empty class, which logicians make a member of every class. But I don't accept that this 'class' exists. It would be a strange addition to space-time!

good nature?) I'd suggest that it is very implausible to say that a particular is white in virtue of its membership of the class of white things, but plausible to say that the particular is in this class because of its whiteness. If so, this seems a good reason (not conclusive, but strong) to reject the Class Nominalist view. A second argument is that if there had been more, or less, white things, that is, if the class of white things had contained rather different white particulars, this altered class would seem not to affect their whiteness.

Class theories are extensional – spreading out – theories, and, as a psychological fact, the human mind works better with extensions. For instance, consider the use of possible worlds popularized by David Lewis. Talking of possible worlds takes possibilities extensionally, and they are certainly helpful in thinking about possibility even if you do not believe in the existence of possible worlds. One can 'picture' the different possibilities more easily. Or consider the Venn diagrams, circles used in the traditional logic to picture logical relations between the terms of propositions. They help a lot. The same holds for probabilities (see the very illuminating book by Gerd Gigerenzer 2002). One can 'picture' probabilities much more easily if one takes them as proportions, say out of 100. But the *intensional* view – the opposite of extensionalist theories – in the present case the view that there are properties *in re,* in the world, which determine the extension of the class – is very often, I think, more satisfactory in metaphysics.

A third position a Property Nominalist can embrace is to take resemblance and *degrees of resemblance* holding between particulars as primitives, and then to suggest that the class of white things, say, is constituted by the resemblances that hold between the members of the class. This is not quite an

intensional theory, but it starts to work away from extensional theories. On this view class members are linked to each other by the relation of resemblance which creates a unity in virtue of which the members are said to have 'the same property'. (An *aristocratic* resemblance theory sets up one or more *paradigm* objects to which the other members of the class approximate in resemblance.)

In my opinion this is a superior brand of Property Nominalism. It is the position taken by John Locke, although he did not work out the details very far. But it is exposed to various difficulties. In my book *Nominalism and Realism* (1978a) I assembled all the arguments that have traditionally been advanced against Resemblance Nominalism, thinking that after a recital of these arguments I did not have to bother too much about this theory. How wrong I was! A younger Argentinian philosopher, Gonzalo Rodriguez-Pereyra, set out in his doctoral dissertation at Cambridge to show that the arguments could be met. He largely succeeded. For those familiar with Dan Dennett's delightful *Philosophical Lexicon*, available on the net and full of good philosophy jokes, he 'exhumed' a position previously thought 'humed'. Rodriguez-Pereyra's book (2002) is a wonderful exposition of 'exhuming', although later chapters are very complex. But here are two further objections to his theory. As he says himself, he seems to need a realistic view of possible worlds to answer a difficulty about coextensive properties, that is, properties with the very same extension. How is a resemblance theory to separate them? Furthermore he needs a rather precise theory of resemblances, which for him come in 'units' of resemblance. This is a difficulty, I think, because resemblance in practice seems a messy and inexact notion.

A final Nominalist position that demands consideration is what I call 'Ostrich' Nominalism. See the debate between Michael Devitt and myself. (Both papers are reprinted in the useful Oxford paperback *Properties*, edited by Hugh Mellor and Alex Oliver.) The idea is that one needs no theory of properties at all and so one can ignore the whole dispute. Devitt does not quite embrace this position, but makes it clear that he would like to get rid of 'attributes' (properties).

If one rejects all these views, as I do, we are committed to there being properties. It is a very natural postulate to make. Consider a certain billiard ball. It has a certain mass and it has a certain colour. It may be in motion or at rest on the table. So the metaphysician seems to be on solid ground in postulating objective properties of mass, surface colour, rest, or motion. Truthmaker arguments are quite strong here. These properties all appear to be intrinsic, non-relational. To have nothing but the ball itself being a truthmaker for both 'the ball is red' and 'the ball is spherical', and so on, seems rather implausible. It is certainly very undiscriminating. (A truthmaker is that particular entity in the world in virtue of which a true proposition is true. It is a relatively new version of the *correspondence* theory of truth, and truthmaker theory will figure largely at various points in this book.)

There are further positive arguments that seem to make the case for introducing properties quite strong. Consider the apparently necessary truths:

1. Red resembles orange more than it resembles blue
2. Red is a colour

The first of these examples was put forward by Arthur Pap (1959), the second by Frank Jackson (1977). They appear

to be about properties, and attempts to analyse these truths without mention of properties run into great difficulties.

Thus, consider a suggested paraphrase:

1′. If x is a red particular, and y is an orange particular and z is a blue particular, then x resembles y more than it resembles z.

Proposition 1 is true, but it is easy to find counter-instances to the paraphrase. Let x be a red car and z a blue car of the same make and model. Now let y be a ripe orange. The respects in which x and z resemble far outweigh the respects in which x resembles y. And what are these 'respects' but properties? Again, 2. 'Red is a colour' entails 'for all x, if x is red, it is coloured'. But that entailment seems not strong enough as a *translation*. Jackson points out that the proposition 'for all x, if x is red, x is extended' may equally claim to be a necessary truth. But we don't think that red is an extension.

So it seems that we ought to accept properties into our ontology. But many matters still remain unsettled. A major issue is whether properties should be taken as universals or as particulars ('tropes' in the terminology first used by Donald C. Williams and now popular among philosophers). Consider two billiard balls that have completely indistinguishable colours (both the very same shade of red, let us say). An upholder of universals will urge that there is just one property here – a certain shade of redness. But the trope theorist considers that there are two shades of redness here – properties that are particulars, as particular as the objects that have them. How is the unity of the class of things that are this exact shade of colour to be secured by the trope theorist? It is now generally agreed that this is done by introducing the relation of resemblance. Resemblance has *degrees* together with

a highest degree: exact resemblance. This highest degree is a symmetrical, transitive, and reflexive relation. (A relation is *symmetrical* if when *a* has it to *b, b* has it to *a*. It is *transitive* if when *a* has it to *b,* and *b* has it to *c*, then *a* has it to *c*. It is *reflexive* if *a* has it to itself.) Such relations pick out *equivalence classes* that can then be used as a substitute for the *identity* that is postulated by those who accept universals. I lean to properties as universals rather than tropes, but the difference between the power of the two theories is not, I now think, very great. But when we get to *laws of nature* it will be argued that universals have one great advantage over tropes, an advantage that I hope may be decisive.

Notice that the trope view is sometimes, with quite good reason, called 'moderate Nominalism'. It accepts properties, but denies that they are universals. It is a 'middle way' that many metaphysicians uphold.

Another issue that arises for both universals and tropes is that between *attribute* theories and *bundle* theories. Bundle theories, to take them first, are so enamoured of properties that particulars, ordinary things, are held to be bundles of properties. Consider all the properties of a billiard ball. On a bundle view the billiard ball is just all of its properties, bundled together by a relation that is often called *compresence*. You can have bundles of universals: the theory adopted by Russell, though only in his later years. He did not get many followers for this view. Or you can have bundles of tropes – the classic, though not the first 'bundle of tropes' theory, is the great essay by the Harvard philosopher Donald Williams: 'The Elements of Being'. See D.C. Williams 1966.

Bundle theories make properties the only fundamental constituents of particulars. But attribute theorists (I'm among them) hold that there are particulars that *have* the properties.

Properties are attributes of particulars. It is sometimes thought that attribute theorists are saddled with a Lockean substance, in John Locke's words 'something we know not what'. That is not correct at all, I think. We are just as aware, say in perception, of the particularity of things – the 'this' and the 'that' – as we are aware of (some) of the properties of things. We perceive that the ball, a particular, is spherical and red. Particularity, I think, is a fundamental metaphysical category that can't be analysed away *and it is given to us in experience*. Aristotle was an attribute theorist, but shows no sign of thinking that particularity is 'something we know not what'.

You will observe that we have a two by two classification of theories here (bundle vs. attribute, universals vs. tropes) with all four boxes filled by actual eminent philosophers. There is one slight complication: you can accept *both* universals and tropes. The English philosopher John Cook Wilson (1926) is such a case. It seems a bit uneconomical but it can be done. (I'll suggest a reason for holding such a position shortly.)

Going back to property theory we need to make a distinction between non-relational properties and relational properties, though with the object of getting the second sort of property out of the way. This distinction is *not* just the distinction between properties and relations, as the examples that follow show. The shape, the size, and, it would seem, the mass, of objects are non-relational properties of particulars. They are sometimes called the intrinsic properties, though one has to be careful with that word. Examples of relational properties are being five miles from any town, or being taller than the Empire State Building. Relational properties thus involve relations (being five miles from, or being taller than) but are not themselves relations. Our ordinary discourse is full of ascriptions of relational properties, but in this metaphysics

at least, they are much less important because they can be replaced without loss by *relations* between particulars. Suppose that you have all the particulars and all the relations in which these particulars enter into, are not all the relational properties there automatically? In more technical language, the relational properties *supervene*, supervene with necessity, on the properties and the relations. It can be tricky, sometimes, to determine whether a certain property is or is not relational (that is why I was a little hesitant to claim mass as a non-relational property) but if it is relational then it is of less ontological importance as a property because of this supervenience.

Now I will argue for something more controversial, but central to my thinking. I maintain that all properties are *instantiated*. That is to say, a property must be a property of a particular. Properties don't have to be instantiated *now*, past or future is enough. But they must be instantiated somewhere, somewhen. (To accept this is to be an 'omnitemporalist' about time. This position about time will be argued for, *via* criticisms of the alternatives, in the second-to-last chapter.) Suppose for instance that the total mass of the universe, though huge, is finite. Then consider the possibility of some mass that is greater than that finite mass. Is not this mass, though not instantiated, a property? No, I say, it is no more than a *possible* property. And a possible entity is not automatically a reality. You can see that this follows from the rejection of 'abstract objects', objects that are additional to space-time. In the case given the merely possible mass is not instantiated in space-time. The natural conclusion for a one-worlder such as myself (one of those who reject the reality of other possible worlds), is that it is a *mere* possibility, one without instantiation.

But can one uphold universals and still reject 'abstract entities'? Are not universals, even instantiated universals, abstract from their very nature? To answer this query we must distinguish between two sorts of universal: 'Platonic' and 'Aristotelian' we may call them. (I won't worry about the scholarship here.) The Platonic view makes its universals 'abstract' or heavenly objects, but an Aristotelian account, which I favour, 'brings them down to space-time'. (There is a slight complication here, which will be picked up when we come to the discussion of states of affairs. See Chapter 4.) It is natural, I think, for an Aristotelian theory to reject uninstantiated universals.

A Platonist view, by the way, might find it necessary to have both universals *and* the corresponding tropes. The universals – the Forms for Plato – would be abstract, while spatiotemporal objects would have trope properties: sphericity might exist abstracted from space-time because for Plato nothing in the ordinary world is perfectly spherical. But individual billiard balls would each have their own trope near-sphericity, that is, they will have sphericity to a certain degree of approximation.

A further conclusion that I draw from my discussion is that properties are *contingent*, not necessary beings. Perhaps there are some properties that are necessary – in logic and mathematics, say – but I am dubious even there. The old line of thinking, introduced by Plato I think, is that universals are very splendid objects, and so are naturally thought of as necessary beings. My idea is to deflate their dignity and see them on the same level as particulars, which are generally thought of as contingent beings.

A bit more explanation is required here. The distinction that philosophers make between necessary and contingent

is naturally drawn in the first place between necessary and contingent *propositions*.[2] It is therefore a logical distinction. A true proposition, *p*, is contingent if and only if its contradictory proposition, not-*p*, though false, is not *contradictory*. In this minimal sense, not-*p* is *possible*. A necessary proposition, *q*, is one where its contradictory, not-*q*, *is* self-contradictory. But it would seem that with respect to *what is proposed* by the two true propositions – the somethings in the world that exist to make the propositions true – there will have to be an ontological difference. Thus arises the idea that we can distinguish between contingent beings or states of affairs, on the one hand, and necessary beings or states of affairs, on the other. This view is accepted by many metaphysicians, and I myself regard it as fundamental to my sketch (though some, such as Quine, reject the whole distinction between contingent and necessary as misconceived). But those of us that do accept the distinction maintain that ordinary objects or states of affairs are contingent beings and that empirical science issues in contingent truths about them, including the laws of nature. Necessary beings or states of affairs, however, are studied in the so-called 'rational sciences' of logic and mathematics. There are problems here that we will have to pick up at a later point of this essay, but here we will restrict ourselves to the idea that universals are *contingent* beings. It is *possible* that they do not exist, in the minimal sense that this possibility does not involve any contradiction. It may be idiotic to deny that you, the reader, exist, but since you are a contingent being, there is no *contradiction* in the denial.

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[2] A theory of propositions will be put forward in Chapter 7. I connect propositions with *intentionality*, and thus with the mind. I do not think that there is an ontological realm of propositions as some philosophers hold.

Notice that it is sometimes said by logicians that that the notions of necessity and contingency are inter-definable, so that both are not required. But their definitions have to use negation and from the point of view of metaphysics the word 'not' brings up very difficult ontological problems that we will be confronting later in this book.

The important point here is that all universals must be instantiated by particulars somewhere and somewhen. Once one has this in mind it can be seen that there seems to be no contradiction in supposing that a certain candidate for being a universal (say Plato's perfect circularity) is nowhere instantiated, although it might have been. With no 'abstract objects' the best we can say is that that there is a possibility of instantiation in space–time but no actuality. This makes universals contingent beings.

We come now to a point that is perhaps the most important modification that needs to be made to get a satisfactory theory of universals. Traditional theories of universals allowed, or tended to allow, universals corresponding to most general words and general concepts. (There is an analogy here with Predicate Nominalism.) The idea was that one can pretty much read off universals from descriptive predicates. I reject this, and this rejection, I'm happy to say, has been widely accepted (among those who accept universals). When David Lewis came to accept property classes, or tropes, or universals (while not choosing between the three positions) he used the word 'sparse' to indicate that he accepted the getting away from an uncritical use of predicates to pick out these classes, tropes, or universals. 'Sparse' is a very useful word here. It tells us that in postulating universals we should not postulate them promiscuously.

The central idea of a universal is that it is a one (the one property in the monadic case) that runs through many particulars. (Though there is a limiting case – a universal that is instantiated by just one particular. I'll argue later in Chapter 4 that there *must* be at least one such case.) In his *Philosophical Investigations* (1953, Sec. 66) Wittgenstein appears to be criticizing the notion of particulars having something in common with his example of *games*. He has been understood as criticizing the notion of a universal. No doubt he is right about games. There is no universal of 'gamehood'. It is far too sprawling and messy a concept. But that will not disconcert the upholder of a sparse theory of universals in any way.

But how do we determine what the true universals are? My suggestion is that they are best postulated on the basis of *total science*. If so, universals and scientific realism need have no quarrel. (I think that this point was also accepted by David Lewis.) This makes the giving of examples speculative and difficult, especially because the true universals may not be identified until, say, we have a completed physics! But I think that the class of the masses: kilos, ounces, tons, and especially the more sophisticated units in which mass is measured may form a class of universals. They can do as examples, at least.

At the same time, though, even when doing philosophy, we often need to refer to properties that are not universals, for instance *being a game* or *being a householder*. I call these 'second-rate' properties. I hope that they are not an ontological embarrassment. My idea (my hypothesis) for dealing with these properties is to deploy a supervenience thesis. Suppose you had a God-like complete account of the world organized as the instantiations of all the universals, both properties and relations. Then, I suggest, you would at the same time

have, with no ontological addition to the world, all the instantiations of the second-rate properties and relations. I don't know how to prove this, but it seems to me to be plausible. It is a case of 'nothing over and above' – always an interesting claim because it gives us the more ontologically economical theory, a virtue if one can get it.

My metaphysics is based on particulars that instantiate universals. But it should be noted that the distinction between particulars and universals has been challenged by some thinkers, famously by Frank Ramsey (Ramsey [1925] 1997) and recently by Fraser MacBride (MacBride 2005), who cites Ramsey. Ramsey's logico-linguistic arguments are complex, but I believe that the most that they show is that one might reasonably deny the distinction. I don't think that they show that a metaphysics that uses the distinction is thereby invalidated. I think that within the system I am putting forward there is a clear enough distinction, as I will now argue.

For me particulars are confined to space-time and universals are all instantiated by these particulars. Given this, following a suggestion by Daniel Shargel, we can say that particulars are things that are subject to change, actual or possible, but universals are not. This becomes evident when we notice that we have a ready understanding of counterfactuals involving change to a part or a property of a particular. It is easy to imagine that one might have been a little shorter than one actually is, or somewhat less irascible. But counterfactuals involving change of universals are very artificial, especially if the universals involve laws, as will be argued at a later point. In this way we can come to see that Plato was right to connect universals with the permanent and particulars with the changeable, even if (as I think) it was wrong to place the Forms outside space-time as he did.

We may end this chapter on properties by calling attention to a useful distinction introduced by W.E. Johnson, that between *determinable* and *determinate* properties (Johnson 1921). Johnson works out the formal distinction very carefully, but only a sketch seems necessary here. Examples of determinables are the properties having colour and having mass. Colours such as red, blue, green, and yellow are determinates relative to colour, but red, for example, is a determinable relative to scarlet, crimson, and so on. Absolute determinates are reached with absolutely precise shades of colour. The absolute determinates of mass are, for instance, the ounce, pound, kilo, each taken precisely. It is a mark of determinates falling under the same determinable that a particular having one of these determinates cannot have any of the other determinates. If some surface is red all over then it is impossible for it to be green, if it weighs an ounce it cannot weigh a pound. This distinction between determinables and determinates will be important when we come to discuss laws of nature.

Determinates are clearly rather good candidates for universals. If you take a scientifically respectable property such as mass, then it is the mass determinates that it is natural to take as universals. Strict identity is essential for universals, and it is plausible, at least, to think that each particular that has mass of one kilogram exact is identical in that respect. But it is much less clear that determinables are universals. They are very useful properties because they collect determinates, say the mass determinates, into a rather unified class. But they do not seem to point to something that is strictly the same in each member.

There are further reasons for thinking that universals must be sought among determinates. If you consider some actual physical situation with bodies interacting, say on a billiard

table, in considering what the causal outcome will be one needs to think only of the determinates of these bodies, their determinate mass, motion, relative situation, and so forth. The determinables seem to play no extra role. Consider also that a determinate – mass 10 kilos say – entails, necessitates, the determinable for that property. Do we want a body to instantiate *two* universals, the determinate mass and the determinable of *having mass*? The second property seems an unnecessary extra, it supervenes on the determinate mass, and so is no addition of being.

In my first treatment of universals I accepted this outlawing of determinables as universals (1978b, Chapter 22, Sec. 1). But in my 1997a, considerations from the nature of laws of nature led me to reinstate determinables as universals. I now think my first idea was correct. I leave this aside for the present, however, until the chapter on laws of nature. It is quite a teasing matter. In the meanwhile we have the distinction between determinables and determinates, which I think Johnson was right to make.

More still can be said about the very rich and important theory of properties. It is a central metaphysical topic. But this more is best postponed until we discuss states of affairs.

Chapter 3

Relations

Coming to the topic of relations, much that has been said about properties can be repeated. Indeed, the word 'properties' is sometimes used by philosophers to cover both properties and relations. Here also a sparse set of relations may be identified as universals. For a relation to be an existent it must be instantiated at time and places. The distinction between determinables and determinates applies: say the distinction between distance and one metre exact distance. It is the determinate relations rather than determinables that are the natural candidates for universals. What the universals are we must wait for total science to tell us, just as in the case of properties.

These resemblances between properties and relations are no accident. I think we should adopt Russell's idea that properties and relations form a series, with properties the first or monadic case, then dyadic, triadic relations, and so on (we can call them the polyadic cases). But here we come to something more controversial. After we get past the monadic case, I think a quite important principle kicks in (at least for the relations that are universals). I call it the *Principle of Instantial Invariance*. For each universal U, if it has n terms in one instantiation, then it has the same number (n) in all its instantiations. My idea is that the number of terms a universal has is part of what that universal *is*. And a universal requires

strict identity in its different instantiations. So, I think, it should have the exactly the same number of terms in each instantiation.

This has been disputed by Fraser MacBride (MacBride 2005), an article to which Jacob Berger called my attention. The Principle of Instantial Invariance treats the adicity (a word for the number of terms in the relation) as an essential property of a relation that is a universal. But MacBride suggests that, if there are universals at all, the adicity could be a non-essential property of a universal, varying across instantiations. MacBride is right to raise this possible objection: I should have argued the point. But I still think that Instantial Invariance is the more plausible. To deny it is to admit some rather strange extra states of affairs, and perhaps strange possibilities, into the ontology. Particularly strange, it seems to me, is that a universal be in one instantiation a property in the strict sense, and at the same time be, say, a five-term relation in another instantiation. But I have been arguing that it is an *a posteriori* matter to decide which properties are genuine universals and it may be that completed science would rule against me here. (By the way, the word 'term' here has nothing to do with language. It just refers to the number of particulars that the relation relates. It is an unfortunate ambiguity in philosophers' usage.) There are, of course, relations that do not obey the demand for Instantial Invariance. A case suggested by Noa Latham is *being the tallest among*. For me, this would show that this relation is not a universal, but is instead a second-rate relation.

There is a really important distinction to be made now between what I call internal and external relations. (NB. There are other senses for this vocabulary of 'internal' vs. 'external' relations.) An internal relation, as I define it, holds

solely in virtue of the nature of the terms. Given the terms, the relation is necessitated. Thus: '12 is greater than 7' is an internal relation holding between numbers, 'Sydney is 500 miles north of Melbourne' is an external relation. It is the external relations that are the important ones ontologically. The traditional cases of external relations are the great majority of the spatiotemporal relations and causality, although necessitarian theories of causation may affect this classification. In the case of the internal relations it would appear that the relations supervene on the related terms, that is, when you are given the terms of the relation, you are given the relation. I'd construe this as showing that such relations are not an ontological addition. (They are an ontological free lunch!) The objects that stand to each other in internal relations could be in completely separate spaces, yet still internal relations could hold between them – relations of resemblance and relations of difference in particular. Resemblance is a notorious instance of an internal relation. There is, for instance, no objection to relations of resemblance between objects in different possible worlds.

This chapter has been short. I do have the feeling that there is a good deal more of importance to be said about the metaphysics of relations, but am unable to make any further contribution.

Chapter 4

States of Affairs

It is time to introduce *states of affairs* or *facts*. (In my usage 'states of affairs' are always existences – though not for all authors.) The instantiation of a property universal is the simplest type of instantiation. With *a* as a particular and F a monadic universal we have the state of affairs *a is F*. With R as a two-term relation we have the state of affairs *a R b*. (Philosophers use the upper case to stand for properties and relations, lower case for particulars.) Russell treated monadic facts as the single-case fact and as no more than the first case of a series which continues as dyadic, triadic, etc. I follow all this. Universals that are relations must, of course, be instantiated as much as properties.

This enables us to understand the Aristotelian 'putting universals within space-time'. You don't take space-time and *then* pour in your universals! Rather, you accept the thesis that the space-time world is a huge and organized net of states of affairs, some monadic, some of higher adicity, so getting universals into the structure of the world. (Notice that states of affairs are also available for trope theorists, if they want them.) I think that these states of affairs are, like their constituents, *contingent* existences. There is no contradiction in denying their existence.

There is a big puzzle in the notion of instantiation. It sticks particulars and universals together. Some have spoken

of a *fundamental tie*. That sounds like a relation, but it seems to go deeper than a relation. After all, if you took, say, a dyadic external relation that related two particulars, then the terms of the relation and the relation seems to demand a tie, just as much as the monadic case. But if the tie is itself a relation, you will need a further tie to tie the second tie in, and a regress of ties of the sort that F.H. Bradley pointed out in his classic *Appearance and Reality* ([1893] 1946) will be up and running. This threatened regress, by the way, is probably the best argument that a Nominalist about properties has.

What must first be done, I think, to deal with this problem is to take states of affairs as *the* fundamental structures in reality. They are primary, particulars and universals secondary. I mean by this that states of affairs are the least thing that can have *independent* existence. Unpropertied particulars and uninstantiated universals are false abstractions, meaning that they are incapable of independent existence. But the situation remains puzzling. I will make a new suggestion at the end of this chapter for resolving the problem.

Something interesting to notice is that states of affairs – *a's being F* and so on – are particulars. The combination of particulars and universals in a state of affairs yields a particular. I call this 'the victory of particularity'. The phenomenon had already been spotted by Russell (Russell 1949). He writes:

There are thus at least two sorts of objects of which we are aware, namely, particulars and universals. Among particulars I include all existents, and all complexes of which one or more constituents are existents, such as this–before–that, this–above–that, the–yellowness–of–this.[1]   (p.213)

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[1] This quotation was brought to my attention by Albert Kivinen.

From this, as I will argue shortly, we can conclude that the world is a particular, not a universal.

We come now to a first brush with negation, a permanent trouble for metaphysicians! Suppose that *a's being F* is a state of affairs. Should we admit a state of affairs *a's not being G*? I reject negative states of affairs. But suppose it to be true that *a* is not G, then I concede, indeed assert, that this truth requires a truthmaker. That will be matter for a later chapter, where I will appeal to *totality* states of affairs (Russell's 'general facts') to do the job. If we reject negative states of affairs, though, then we must also reject negative universals. If F is a universal, then *not being F* is not a universal, although the *predicate* 'not being F' is a perfectly good predicate. Notice also that there might be a positive universal X that happened to have the very same extension as the class of non-Fs.

How do we decide what are the positive properties? Not by semantics alone. I think it is an empirical matter, which of course is close to the idea that universals have to be identified *a posteriori* on the basis of our best science. The notion of a vacuum is an interesting one here. A vacuum is, verbally, space with nothing in it. But physics tells us that all sorts of things are present in a vacuum, particles, and perhaps magnetic or gravitational fields if you are a realist about fields. So perhaps vacuums are not as negative as seems implied by the word. There are also some tricky cases where philosophy may have to make the decision. Consider the terms 'identical' and 'different'. 'Different' means 'not identical'. But is difference the negative notion? Peter Simons is one philosopher who thinks difference is the positive notion (personal communication). It does seem to me to be the less empty term, though I have no clear argument.

What about disjunctive states of affairs (say, *either a is F or a is G*) and with these, disjunctive properties (*either F or G*)? Neither of these do we seem to need. (Though science might surprise us here.) If F and G are both universals is *being F or being G* a universal? I don't think so. But I am inclined to accept *conjunctive* universals. If *a* instantiates universals F and G then F&G is a universal, I think, though there is disagreement about this. I have two arguments for this view, though they are not conclusive. (i) The conjunction passes a very important test for a universal: it is a one that is strictly the same in its different instances. (ii) There seems to be the epistemic possibility, that is to say, 'a possibility for all we know', of conjunctions 'all the way down'. F and G, perhaps, are themselves conjunctions of universals and so on without end. This situation would make it necessary to accept conjunctions of universals as being universals, but how we could ever have good evidence of such infinite structures is admittedly hard to see.

An important sort of universal, of which a conjunctive universal would be a simple case, is what I call a *structural* universal. It can be illustrated by reference to the methane molecule, M, which, let us assume for our purposes here, is a universal, *being a methane molecule*.

$$
\begin{array}{c}
\text{H} \\
|\\
\text{H} - \text{C} - \text{H} \\
|\\
\text{H}
\end{array}
$$
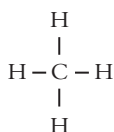
Here we have a single carbon atom connected by different instantiations of the *bonding* relation B to four hydrogen atoms. Suppose B, C, and H are each of them universals. Then M is a structural universal, involving universal properties and relations, B, C, and H, which we may call *constituents* of M.

(There is the epistemic possibility of structures all the way down.) It is very important to notice that structural properties themselves enfold states of affairs. The four bondings in the diagram above between hydrogen atoms and the one carbon atom are each states of affairs of a certain sort.

As a matter of fact though, H, C, and M are somewhat dubious cases of universals. Molecules and atoms are *kinds* of things, and the metaphysical status of kinds is not entirely clear to me. Kinds usually involve very complex structures – think of kinds of animals, of plants, even of kinds of cells, and all the different sorts of parts that they have – and it becomes uncertain whether all the members of a particular kind have something *identical* running through all of them, the mark of a universal. Perhaps there are particulars that can meet this strict condition – quarks, say, or other fundamental particles – but macroscopic kinds seem dubious. There is something property-like about kinds, but strict identity (or the parallel notion of exact resemblance in a trope philosophy) may be beyond them.

I favour, a bit uncertainly, a supervenience thesis about kinds. Suppose we are given all the particulars with all their (universal) properties and (universal) relations. Then, perhaps, the kinds supervene, that is, are nothing over and above the properties and relations of things.

We can pause here to note the biggest structural property of all, of which there can only be one instantiation. Consider the whole of space-time (multiple big bangs and all, if there are many big bangs as some cosmologists now think likely) that I hypothesize to be the whole of reality. Take all the particulars, past, present, and future, with all their non-relational properties and all their relations to each other. (It may well be that there is an infinite number of states of affairs,

though the infinity – up or down – is not an established fact.) This constitutes the biggest structural property. We can't begin to spell it out but it seems it must be there. It involves, as constituents, every lesser state of affairs. The lesser states of affairs therefore supervene on it because they are enfolded in the all-embracing property. (Of course, it might have been bigger or smaller – it might have been different in all sorts of ways.) This property has just one instance. I like to call it W. There is a particular, call it w, that instantiates this property. The state of affairs that embraces the world is *w's being W*. And that is also a particular, by the 'victory of particularity'. The world is a particular as well as being a state of affairs.

Going back to the distinction between the relational and the non-relational or intrinsic properties of particulars, it is, as already argued, the latter, the intrinsic properties, that are the really important properties of particulars from the point of view of metaphysics. In our ordinary discourse we do not mark the distinction at all clearly. Think of predicates like 'mother', 'father', 'sister', and 'brother'. They, it is clear, involve relations, causal relations as it happens. Such descriptions are socially very important for us. But they are not intrinsic properties. And from the standpoint of metaphysics it is the intrinsic properties, shape, size, mass, chemical constitution, and so on, that are central. The relational properties of particulars are in some sense superfluous. Suppose that we are given all particulars and their intrinsic properties and that further we are given all the external relations (the relations that do not involve in any degree the intrinsic properties of the related things). Then we do not need the relational properties of objects as any sort of extra. The relational properties supervene.

Here is another way to make the point. The intrinsic properties of things are, in a somewhat stretched but real sense, *parts* of the things. Ordinary parts are *bits* of things, the totality of the bits making up the thing. Intrinsic properties are not like that, but they do make a contribution to the make-up of the thing. They are parts in a stretched sense. Relational properties, however, are not *anything* like parts. I think it is clear, then, that there is a big ontological difference between intrinsic (non-relational) properties of objects and their relational properties. This is a bit obscured by the fact that the distinction is not very clearly marked in ordinary language.

Let us now go back to the really central notion of the fundamental tie, the tie that brings together particulars and universals to give us states of affairs. I have a new suggestion to make. Hume argued, in effect, that it is impossible that there could be necessary connections between (wholly) distinct entities. The principle is quite attractive, and many empiricists have upheld it (including myself). But I am now going to suggest that we could relax it a little. Suppose we allowed there to be necessary connections *in re*, in the world. In particular suppose we were to postulate an objective necessity holding between particulars and universals. We might well make the connection to be of a limited sort. It might be no more than this. Universals (contingent beings as I think) need not have just the instantiations that they actually have. But they must (an anti-Humean *must*) be instantiated by particulars, at least once. Particulars (contingent beings) need not have the properties they actually have. But they must (an anti-Humean *must*) instantiate universals. There would then be a mild necessary connection between particulars and universals, and this would be the 'fundamental tie' that

so many metaphysicians have felt it necessary to postulate. Particulars and universals would retain their distinctness while needing connection with the other. States of affairs would remain contingent beings.

I don't know how to back up this suggestion except as an *inference to the best explanation*. It explains the mysterious nature of the fundamental tie that holds the constituents of states of affairs together, thus giving us the states of affairs, and it rids us of uninstantiated universals and particulars, objects that have no intrinsic properties, no intrinsic nature, no natural place. They do this with a minimal (though real) departure from the Humean distinct existence principle.

I'll finish this chapter by considering two points. One difficulty was raised by Wade Martin, also a graduate student at CUNY. How, he asked, do we differentiate one property from another? Would I not be forced, he asked, to postulate properties of these properties in order to do the job? But it is clear that this would lead to a most unpleasant regress of properties.

I think that answering this query leads to an important consideration in the theory of properties. If we use the word 'property' to include relations, then the different adicities would mark off many properties from each other. Consider then two properties that have the same adicity. How do we differentiate them? Some perhaps are complex and so have a structure. Difference of their structure will differentiate them. But there may well be *simple* properties with the same adicity, say all monadic. How do we differentiate them? In my book *A World of States of Affairs* (1997, 10.41) I put forward an idea that I still like: such properties would be *numerically* different only. Many philosophers have argued, rightly I think, that it is possible, though perhaps it never actually occurs, that

two particulars, two spheres say, could have exactly the same properties.[2] My suggestion is to extend this to properties. Suppose, for instance, that the two properties are monadic and simple. Then I propose that although they are different, they are numerically different *only*.

The second point is this. Wittgenstein said at 1.1 in his *Tractatus* that the world is the totality of facts, not of things. I think he was here echoing (in a striking way) Russell's idea that the world is a world of facts. I put the same point by saying that the world is a world of states of affairs. To say that the world is a world of things seems to leave out an obvious point: how these things hang together, which must be part of reality. Interestingly, my own teacher in Sydney, John Anderson, used to argue that reality was 'propositional' and appeared to mean much the same thing as Russell and Wittgenstein. One could say metaphorically that reality was best grasped as sentence-like rather than list-like.

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[2] See the classical paper by Max Black, 'The Identity of Indiscernibles', 1952.

Chapter 5

Laws of Nature

Once you have universals in your ontology, one starts think-
ing rather naturally that one might use them to cast light on
the topic of laws of nature. After all, the laws are the funda-
mental ways in which things behave, and ways of behaving
depend on the properties of things. And if properties are
universals, laws should somehow connect the universals that
particulars instantiate. In the seventies of the last century the
very same idea came to three persons: Fred Dretske, Michael
Tooley, and myself. After all, why not give an account of
the laws of nature as *direct relations between universals*? We all
published within a year of each other, Dretske and Tooley in
articles, myself at the end of the second volume of my 1978
book on universals. That was a remarkable manifestation of
the *zeitgeist*: the spirit of the times that impels different people
to come up with the same idea quite independently. We had
no connection with, or influence on, each other. Dretske's
article in *Philosophy of Science* (1977) was very straightforward
and is an ideal article for a student to read first.[1] Tooley's fine
but more difficult paper appeared in the *Canadian Journal of
Philosophy* (1977). I went on to produce a book *What is a Law
of Nature?* which came out in 1983.

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[1] I once said to Dretske that his paper was so useful because it presented the
theory before it became 'sicklied o'er with the pale cast of thought' (Hamlet).
This was taking a risk, but Fred was not offended by the joke.

The driving force for all three of us was dissatisfaction with the then reigning 'Humean' account of laws which, if we put it in the context of a 'states of affairs' metaphysics, holds that laws are merely regularities in the connection of these states of affairs. They supervene on the totality of these states of affairs. Lewis refers to the view as the thesis of Humean supervenience. He gives the classical treatment – building on the work of John Stuart Mill, and then Frank Ramsey ([1925] 1997) – the Mill–Ramsey–Lewis account of laws. Laws are a systematic and organized set of regularities in nature, nothing more. (For detailed critique of this position see the first part of my book *What is a Law of Nature?* (1983). I argue that it has many weaknesses.)

Let's take one often quoted case that lets us see the rather implausible *lack of strength* in the Humean supervenience view. Consider and contrast a mass of uranium 235 and a mass of solid gold. Make the masses rather large – say the size of some ordinary house. We know that there are no such masses. But in the uranium case we think that this is a nomic (law-like) affair. The mass of the uranium would be way above critical mass and so would have to explode and destroy itself (or at least this would be overwhelmingly probable). What about the mass of gold? We know that such a mass does not exist and almost certainly will never exist. But there does not seem to be anything in the laws of nature that would rule out such a mass of gold. There is something a bit accidental here. There may not be any way to collect so much gold, and in any case there is no reason to deplete the rest of the world's gold in this way. But it seems to be *nomically possible*, that is, it is not ruled out by the laws of nature. The M–R–L theory struggles with this point.

But what the three of us suggested for laws was a *non-supervenient direct link* between universals. Suppose that all Fs are Gs, with F and G universals, then this will suggest (but certainly not entail) that there is a direct link between the two universals such that *being an F* ensures *being a G*. (This is a toy example – in reality the situation will be far more complex than this, but it should help to grasp the move we made.) I symbolized the relation as a higher-order universal, the relation of 'N'. So we have the nomic state of affairs N(F,G), additional, not supervenient on, the first-order states of affairs. 'N' was chosen as standing for nomically necessitates, but this necessitation was taken by all of us to be a *contingent* relation between the universals involved. The idea is that N(F,G) should entail that all Fs are Gs, although there is no entailment in the reverse direction.

You can see how this enables one to say something very interesting: that laws *explain* what happens. Fs are observed, and they are all observed to be Gs. We explain the observation by postulating that there is a direct connection between the property F and the property G. This is a case of what is often now called *inference to the best explanation*.[2] We go from the regularity to the laws that explain the regularity, though not deductively. Humeans can't do that. You don't *explain* a mere observed regularity, which is all they allow, by postulating that the regularity holds for unobserved Fs, in particular by future Fs.

It is to be noted further that this gives some handle (I'm not sure how much) on the famous *problem of induction*, the problem of getting from observation to the unobserved.

[2] The phrase 'inference to the best explanation' was first introduced by Gill Harman (1965). A whole book on the topic has been written by Peter Lipton, 2nd edition, 2004.

By giving an explanation for the observed regularity, the 'connection of universals' theory gives some reason to believe that the regularity will hold for the unobserved instances of F. Hume and Humeans, however, have no basis for the belief that the future (or more generally the unobserved) will resemble the observed.[3]

Nice work if you can get it. But a great many philosophers have asked what is the warrant for the inference, which must be an entailment, from N(F,G) to the state of affairs that all Fs are Gs. Is it not established by simply assuming it must hold?[4] One sign that seems to show that something has gone wrong is to ask what happens if we have a law of nature that involves like ensuring like. Newton's first law of motion would be a case in point. A body in uniform motion and not acted upon by a force ensures that the same motion is maintained. Wouldn't we need to symbolize it as N(F,F)? But a universal linked to itself sounds crazy. In my 1997a book, I finally found a way to explain the situation. But I cannot blame Stephen Mumford for saying in his book (Mumford 2007, Chapter 3) that my new explanation is a new theory. I'm glad to say he thinks it is a better theory.

It is states of affairs that should be appealed to in the first place. We need the notion of a *state of affairs type*. If *a* is F then the corresponding state of affairs type is *something's being F*, which we can symbolize as:

$$\underline{\quad}F$$

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[3] See my paper 'What makes Induction Rational?', 1991a, for further discussion.

[4] By far the most penetrating criticism came from Bas C. van Fraassen in his paper 'Armstrong on Laws and Probabilities', *Australasian Journal of Philosophy* 65 (1987), 243-60. I replied in the same journal in 1988: 66, 224-9, but I did not then have available the notion of states of affairs *types*.

If we consider a dyadic state of affairs of *a*'s having R to *b* then it can be symbolized as

$$\underline{\quad} R \underline{\quad}$$

It is easily seen that states of affairs types supervene on states of affairs, and so come at no ontological extra cost. Perhaps, indeed, one can identify these states of affairs types with universals (it makes the need that universals have for particulars very clear) but I don't think we need to settle the matter here. Perhaps it is just a verbal matter, anyway. It then seems natural to bring in *causality*. The link between the states of affairs types seems to be a causal one. But I will leave commenting on this point just for the moment.

Suppose, now, that *a*'s being F *causes* *b*'s being G. (Absurdly simplified. F and G are universals, of course.) The corresponding state of affairs *type* can be symbolized in the following way:

$$\underline{\quad}1 \text{ being F causes } \underline{\quad}2 \text{ being G.}$$

The numbers are there to indicate that the connection runs between two different particulars. It is plausible that the first particular, *a,* must stand in some particular relation – say, a spatiotemporal relation – to *b*. That's what you would expect in ordinary cases of causation. You would have

$$\underline{\quad}1 \text{ stands in (spatial) R to } \underline{\quad}2$$

with the same two particulars picked out by the numbers. Given that spatial R holds between 1 and 2, then something of the *type* 1 causes a state of affairs of *type* 2. Here will be a crude model of a causal connection holding between universals. And because the connection is between types it will ensure that the connection is law-like.

It will then be seen that this dissolves the problem posed by that puzzling N(F,F). If we analyse this in terms of states of affairs types, there is then no objection to:

$$\underline{}_1 \text{ being F causes } \underline{}_2 \text{ being F.}$$

1 and 2, for instance, might be successive time-slices of a continuing thing or process, something that we will look at shortly.

But notice that a jump has been made. It is an ontological hypothesis that there are states of causal connections of the sort just indicated that link states of affairs types. What I plead for the hypothesis is that it gives us a plausible way of saying what laws of nature are, while denying that they are just regularities. If you don't think that there are laws of nature (perhaps because you believe in *powers* instead) then you don't have to accept this analysis. You must, of course, have universals in your ontology to work this trick. But is it not a *reason* for having universals? You can't turn the same trick with tropes.

One may be troubled by the suspicion that not all laws of nature are causal laws. It is a bit troubling, I would concede. Perhaps the conservation laws that play such an important role in physical theory are not causal laws. Causal laws *ensure* (or make probable to a particular degree) a certain outcome. But perhaps there are ensurings that are not causal.

But now for some delightful rewards. We have in the previous chapter touched on *structural* properties. So now I suggest that the laws of nature as symbolized above are themselves a species of structural universal. They are universals that involve causal connections, but that does not seem to be an objection to their being universals. There are plenty of structural connections – supportings, holding things in

place, for instance – that seem to involve causality of some sort – why should not some structural universals involve such causal connections? In the case of the methane molecule previously discussed the *bindings* of the four hydrogen atoms to the carbon molecule are certainly causal.

If laws are a species of universal, then, according to me at least, they have to be instantiated at some place and time. Well, we talk of laws being instantiated, do we not? (The points where the laws are 'operative'.) So this instantiation of laws is the instantiation of a special sort of universal. (Note that this would require every law to be somewhere instantiated in space-time.)

Now for a further point. The instantiations of the law, I now assert, are *all there is* to the law. The law, being a universal, is *completely* instantiated at every point where it is instantiated. It is instantiated in the singular case. And there is nothing else to the law. One consequence of this is that there cannot be laws that are never instantiated. But one might have a case like this. Suppose that one has certain instantiated laws, and that it can be *deduced* from these laws that if certain boundary conditions occur, that is, if there are certain distributions of particulars of a certain sort, then certain results will follow. But suppose that these particular boundary conditions never obtain in the whole history and geography of the world. Then, perhaps, one would have a secondary sort of law for conditions that never occur. One might call them counterfactual laws.

So, I claim, with the help of universals and the device of states of affairs *types* we have been able to define what we might think of as an intermediate necessity, intermediate between Humean contingency and necessity. We might call this 'nomic necessity'. We can easily adapt this account to

deal with the situation where laws are merely probabilistic. One might simply subscript the nomic necessity with a figure between 0 and 1. If the laws involved are causal laws, then one can interpret this as *probability of causing*. I say 'probability of causing', rather than 'probabilistic causality'. My idea is that the word 'cause' can remain univocal here. Causing, where it occurs, remains the same. A probability of causing is, I suggest, a probability of *ordinary* causing. It is just that the causing does not always happen, although conditions for it are ripe. Such a probability of causing would, of course, have to be an objective feature of reality, which some might object to.

A shortcoming of what has been said so far is that the laws, or hypotheses for laws, that science actually works with are functional affairs, regularly expressed in equations. If you consider, for instance, the Newtonian law of gravitation (for simplicity), you see that it covers a huge number of empirically possible cases: different masses at different distances with a general formula (for two objects at different distances: $F = M_1 \times M_2 / D^2$. This leads to a difficulty that I did not originally notice.

If you consider the gravitation formula immediately above it will be evident that F, M_1, M_2, and D are determinables not determinates, to use the terminology explained at the end of Chapter 2. The symbols are variables that range over the different forces, masses, and distances that may be involved in actual states of affairs. In my *World of States of Affairs* (1997a) I suggested that this should be explained by going back on the idea that determinables could not be universals. Functional laws should be accepted as connections between *determinable* universals.

The trouble about this move, though, is that there seem to be a number of reasons, explained in Chapter 2, for thinking

that these properties are not universals. It is, for instance, determinate properties that are actually operating in causal interactions between particulars. My present view, therefore, is that the determinables are not universals, as I originally argued. So what becomes of the idea that laws of nature are connections between universals (states of affairs types)?

We have to say, I think, that functional laws are bundles of what we might call *particularized laws*, laws that hold for determinate properties, determinate forces, masses, and distances in the case of the gravitation law. The determinables, very important properties but not universals, when suitably connected by some mathematical relationship, give, as it were, 'instructions' for the particularized laws where the work of the world is done.

This account does lead to a consideration of 'missing values' in the case of particularized laws. May there not be determinate values for functional laws that are never instantiated in the whole history of the universe? We can think up possible cases. Suppose that the world has a finite mass. Then we might still think that if it had a greater mass than it actually has, still one might think that a gravitational law might apply to such cases using the formula supplied by the law. The result would be a *counterfactual*: if masses of such a sort were instantiated, then a certain upshot would have occurred. For scientifically good reasons, one might be inclined to assert such a counterfactual. Would this case need uninstantiated universals as truthmakers for these truths, assuming them to be truths? Platonists might like to think this way. I'd prefer a more economical solution. The truthmaker would be the connection between the determinables properties that explains the observed connections in the actual cases. Given the law plus the imaginary case, the outcome is

determined. That is the reason for calling the counterfactual a truth.

Causation. We have introduced a new theme in this discussion: causation. The Humean account of causation (leaving aside the question whether this was Hume's own view, a matter that is disputed by historians of philosophy) is that *token* causality, say this particular impact that pushes over this glass of water, is causality only in virtue of the fact that what has happened is the same all over the universe. What makes the token sequence causal is a *relational* property of the sequence for Humeans. The opposite view is that token causality is an *intrinsic*, non-relational, property of the token sequence. The metaphysical choice here can be seen as like a *Euthyphro* question, like the question whether the goodness of an act is determined by some relational property (such as a certain sort of approval) or by the intrinsic nature of the act.

It is very plausible, I think, that the causal relation is intrinsic, intrinsic to its token pairs, and this is my view. This makes me a *Singularist* about causation. Such a view is compatible with the idea that instantiations of laws of nature are instantiations of connections holding between states of affairs types. The simplest hypothesis, and the one I accept, is that singular causation *is* nothing more than the instantiation of some law.[5] This is a theoretical identification. It remains rather a moot point, as already mentioned earlier, whether every instantiation of law is a case of causation, a point about which I am uncertain. My inclination is to think that if this is not so, the point does not mark some major ontological

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[5] For details see my article 'Going through the Open Door Again: Counterfactuals versus Singularist Theories of Causation', Armstrong 2004b.

distinction between laws that do, and laws that do not, involve causation. But this may be wrong.

The acceptance of the singular causation raises a very interesting epistemological question. Can we perhaps *perceive* causation, perceiving it in the direct sort of way that we perceive colours, shapes, distances, and other sensible qualities and relations? We could hardly do this if a Humean account of causation is correct because it would be magical to be perceptually sensitive to vast regularities over space and time. The best one could do then is to make some sort of inference from bodily sensations. But if causation is singular, then there seems to be an obvious candidate for perception: the action of various forces upon our body. This is information that we need for the immediate conduct of life and if it is lacking we would be most grievously handicapped. Relevant here seems the case described by Oliver Sachs of the woman in 'The Disembodied Lady' (in Sachs 1986) who suffered total loss of her proprioceptive capacity (perception of her own body), leaving her with almost no information about the state of her body save what could be painfully and artificially gained by vision. She could not be directly aware of the action of the world on her body. But we luckier ones are so aware, and so, it seems plausible, are aware of causal action on our body. Of course, even if my suggestion here is correct, we would not be experiencing the operation of a causal law. What we experience when we experience the operation of causes on our body will be the mere *resultant* of the causes operating upon some portion of our body at that time.

You can put the point by saying that among our sense impressions should be included sense impressions of some of the forces that act upon our body. David Hume, it may be

remembered, argued that all our ideas (concepts) are derived, directly or indirectly, from sense impressions. But he says that he is unable to find any impression of causality, and in particular he denies that there is any impression of the *necessary connection* between cause and effect. All the senses give us, he assumes, are regular successions. I think that this is very likely quite wrong. In Humean terms, there are impressions from which we can derive the idea of causation. There are such impressions, impressions of forces acting on our body. Impressions can err, of course (error is always possible in perception), but in veridical cases we are able, I claim, to perceive causal action on our own body. (And we don't have to think, as Hume seems to assume, that this would have to be a necessary connection. It could be contingent.)

Incidentally, Hume also denies that we experience causality in connection with willing our actions (in many places in his *Treatise* and *Enquiries*). I think he may be wrong here also. There seems to be direct introspective awareness of causes here, once again. We can be aware, with the usual caution that we might be mistaken, that we have successfully *acted* in a certain situation, that what we did sprang from our will as cause. (I'll try to cast some further light on this in the last chapter – about the mind.)

I have already suggested that the 'fundamental tie' might be construed as an objective necessity that universals must always be instantiated somewhere, and particulars must have properties. They need states of affairs to live in. It would be nice to have a further addition. Universals must be subject to laws, so must link up with universals in nomic (law-like) fashion in the way we have just discussed. But, at the same time, what particular laws the world obeys would be contingent. The attraction of introducing *this*

necessity into the world is that it would outlaw *epiphenomenal* universals – universals that exist, are instantiated, but have no nomic links to other universals, and so, according to my theory of laws of nature, no power in the world. How would we know of their existence?

Chapter 6

Reacting to Dispositionalism

So that was a sketch of my present version of the theory of laws of nature. But in recent years a line of criticism of this theory has been developed which demands consideration. The critique is associated with *power* theories of properties, a new, or rather a revived view, of what the nature of properties really is. It does not deny the existence of properties, indeed it insists on them, but it holds that they are powers, powers to cause certain effects. On that basis a critique is launched against David Lewis' neo-Humean view of laws of nature, and also on the 'connection of universals' theory. Important figures are Sydney Shoemaker in the US, Robert Black, Stephen Mumford and Alexander Bird in the UK, George Molnar (deceased, but see his posthumous book *Powers* 2003) and Brian Ellis in Australia, C.B. Martin in Canada (previously Australia), and a follower of his in this regard, John Heil, in the US. Some of these people uphold universals – the majority – and some uphold tropes, but that won't matter much to our discussion here. They are all regularly called 'Dispositionalists'. (The contrast is with Categoricalists – *not Categorialists* – the sorts of theory that the Dispositionalists try to displace.)

I must say something about dispositions in the first place. The word is a technical term in philosophy. Typical cases of dispositions that are used to illustrate the notion are solubility,

elasticity, and brittleness. Associated with dispositions are certain truths. Thus: if salt is put in water it will, in ordinary circumstances, dissolve. So salt is said to have the disposition *soluble in water*. If some salt is actually put in water and, as a result, it dissolves then this result is said to be a *manifestation* of the disposition. A very important point is that a particular quantity of salt may never manifest this disposition in the whole history of that quantity of salt. *Unmanifested* dispositions of particulars are perfectly possible, and, indeed, it is normal for particulars to have dispositions that are never manifested in the whole of their history. There is now a large philosophical literature on the topic of dispositions. It is a plausible thesis that in every case of cause and effect the effect can be seen as the manifestation of some disposition or dispositions, and such a view would be a congenial one for a Dispositionalist.

But the Dispositionalists go a great deal further than this. They wish to resurrect the old pre-Humean idea of *powers*. Powers may be *necessitating* or *probabilistic*. A necessitating power is a deterministic one, and where the power manifests itself there is a *necessary connection* between the power and its manifestation. The Humean idea that there is no necessary connection between wholly distinct existences is completely rejected, much more than my cautious qualifying of that idea at the end of Chapter 4. If the power is such that it gives only a *probability* of manifestation in suitable circumstances, something that seems to occur at quantum level, there remains of necessity an objective *chance* of a manifestation of the power in question. Perhaps all powers are a bit chancy in this way, but that is a matter for physics. Notice, by the way, that Dispositionalists can take their powers to be universals or to be tropes, and being philosophers they naturally divide on the issue of tropes vs. universals!

One problem that the Dispositionalists face is to give an account of the laws of nature, for them the laws (or perhaps they would prefer to speak of equations) that govern the operation of powers. That is not a question that they have yet turned much of their attention to. But it gives an occasion to go back to the account of laws of nature that I favour. What account of dispositions should the universals theory give? On particular occasions dispositions are manifested. These manifestations will be explained without difficulty because they will be explained by appeal to the laws of nature. All the universals theory has to do is to give an account of *unmanifested* dispositions. My suggestion is that such dispositions are no ontological addition to the world. An object, say a drinking glass, begins to fall towards a stone floor, but it is grabbed before it reaches the floor. The brittleness of the glass is fortunately not manifested on this occasion. But can we not identify the unmanifested disposition with the nature of the glass, that is, with one or more *properties* of the glass? The Dispositionalist may respond that these properties are themselves dispositions. But that would be to beg the question against the Categoricalist position I am defending. The property of the glass in virtue of which it is brittle is likely enough to be a structural property, involving the fundamental particles that make up the glass and the laws of nature that govern the spatial interrelations of the particles, but the view I am defending is that these are ultimately categorical. It is likely, also, that various counterfactual propositions are true in the situation, for instance, 'if you hadn't grabbed it so quickly, then it would have broken'. But these counterfactuals, I think, though true, are not true in virtue of any ontological addition to the world. This last point will be discussed later when we come to consider the ontology of possibility.

But let us return to the discussion of Dispositionalism. Causes have certain properties and it is in virtue of these properties that they produce effects ('manifestations' for a Dispositionalist) also having certain properties. But what will these properties be? Must not the Dispositionalist say that they are dispositions? The following picture emerges. There are particulars having certain dispositions that act in virtue of these dispositions, that is, are causes. They produce certain effects, manifestations, and they are dispositions also. We seem to be in a world consisting of particulars that have dispositions *and there is nothing else there*. It is a world of dispositions, or rather, because Dispositionalists in general do not try to reduce particulars, it is a world of particulars having nothing but dispositions. This, I think, is a sort of nightmare. One might call on external relations between particulars to add something that is not dispositional in nature. But the thoroughgoing Dispositionalist, instantiated by Sydney Shoemaker (Shoemaker 1984), will dissolve relations into dispositions also. Dispositionalists talk of manifestations, but a manifestation that is nothing but a disposition to produce manifestations that are dispositions to produce manifestations that are . . . seems to me to be a very unsatisfactory metaphysics. It may not involve a contradiction, but that seems not enough of a merit.

Relations, moreover, look to be a particular stumbling block to this position. Can they be brought within the scheme? In the Newtonian case it is fairly easy to think of the masses involved as mere powers. But how do we handle relations such as distance? If they too are powers, what will their *manifestations* be? Two things moving towards each other? But two things moving towards each other hardly seems to be a power, which it ought to be if Dispositionalism is a correct view.

There is, however, a line of criticism, inaugurated by Robert Black, which has been launched against Categoricalists (Black 2000). Black accuses us of *Quidditism*, of being landed with properties that do no real work in the world, and so constitute a serious weakness in our metaphysical position. He focuses on the contingency of the laws, which the universals theory holds to in common with the Humean position. Here is how his argument goes. Suppose that the law connects universals F and G in a certain way and another law links H and J. He points out that in another possible world things might have been different. Universal F, say, might have been linked nomically to J, and H linked to G. This we Categoricalists must accept because it follows from the contingency of the postulated connections. But, the argument continues, this need not involve any difference in the way the world would work. Everything else would go on all the same. This, Black argues, shows up a striking lack of economy in the universals theory. Dispositions, however, are essentially causes, so they do not, he argues, have to be hooked up *via* these mysterious categorical properties.

While jibbing at 'mysterious' I think that the universals theory has to accept the case. Such a scenario is a possibility. But it is a *mere* possibility, comparable to the possibility that the world began five minutes ago, or will come to an end in five minutes' time, or for that matter the possibility that the world is really Humean, though appearing to be governed by strong laws, a 'possibility' that the universals theory has always cheerfully accepted.

It may be noted, also, that some Dispositionalists, in particular Ellis (2001) and Molnar (2003), appreciate the implausibility of a complete Dispositionalism. They exempt

spatial properties and relations in particular. Their positions are thus a mixture of Dispositionalism and Categoricalism (Quidditism). So they are in no position to push Black's argument. (Ellis, incidentally, makes *kinds* central in his Dispositional scheme.)

Chapter 7

Particulars

During our discussions so far, caught up as we have been with universals and the difficult topic of laws, we have not paid much attention to particulars: sticks, stones, trees, animal and human bodies! So we should now consider their nature. They persist through time, and we consider them one thing during that time. But I don't think we should take this too seriously. This is because I don't think that this involves *strict* identity through time. (To use contemporary jargon, the view advocated here is a *perdurantist* rather than *endurantist* account of the identity of particulars over time.)

I think that we can with advantage here go to a distinction drawn by the 18th century bishop and philosopher Joseph Butler between what he calls the *strict* sense of identity and a 'loose and popular' usage of words where something much less strict is demanded. He uses it in his discussion of the identity of objects such as trees over time. He writes:

For when a man swears to the same tree, as having stood fifty years in the same place, he means only the same as to all the purposes of property and uses of common life, and not that the tree has been all that time the same in the strict philosophical sense of the word. For he does not know, whether any one particle of the present tree be the same with any one particle of the tree which stood in the same place fifty years ago. And if they have not one common particle

of matter, they cannot be the same tree in the proper philosophic sense of the word *same* . . . .   ([1736] 1906, pp.258–9)

Butler applies this idea in his discussion of the identity of particulars over time (pp.258–9). It is very plausible for innumerable cases. Any macroscopic particular will be changing the whole time, yet we will be happy to say in most cases that it is still 'the same particular'. There are of course cases where the change is so great that we will not be prepared to speak of sameness of particular even in this 'loose and popular' sense. If a drinking glass shatters into a myriad of small pieces, there is no drinking glass left. Ideally, conditions for 'loose and popular' identity would need to be spelt out. But that is a rather detailed investigation that will not be pursued further here. Notice that this sort of loose identity will very often apply to the gaining and losing of parts of the particular in question. But also note that there may be *fundamental* particles that make up ordinary particulars where these particles stay the same in a more fundamental sense of sameness, exactly the same, just as Butler allows.

So I think that the identity of an ordinary particular is only this 'loose and popular' identity that Bishop Butler refers to. After all, if the states of affairs theory is correct, as I have argued, then at any particular time (each *time-slice* of the object in the jargon) the particular is a hugely complicated state of affairs, and furthermore is in perpetual flux. If you really want the unchanging particular instead of a temporal 'bit' of the object you need, I suggest, to consider the object four-dimensionally, as a 'space-time worm' to use yet another bit of jargon.

But that is only a beginning. After all, all sorts of space-time worms exist in space-time and only a few of these will be

what I have called particulars. You can 'draw lines' arbitrarily in space-time in the fashion of a space-time worm and yet not capture anything that we would think of as a particular. What marks off ordinary particulars? First, continuity of existence plays an important part (though there are objects that are disassembled periodically and then reassembled). There is, in general, spatial continuity over time. Second, resemblance is important, especially between nearby slices, and where there is change in nature that change should generally be not too abrupt. But although these things are important there is something more hidden, that seems of great theoretical interest: it is causality. There ought to be causal links that link together the successive temporal segments of the continuing thing. Russell in his unjustly neglected book *Human Knowledge: Its Scope and Limits* (1948) went so far as to call particulars *causal lines*. I think he was right.

What is the argument for this causal binding together of successive parts of a particular? The compelling argument comes from considering the negative case. Suppose a space-time worm that has continuity of the right sort and where the continuous slices closely resemble each other. But suppose that there are one or more *causal breaks* at certain times in the existence of the supposed particular. At these points there is absolutely no causal (or other nomic) connection between what goes before and what comes after. I think we would not be prepared to say that it is 'the very same thing' before and after. Instead what succeeds is no better than a mere simulacrum of what went before. (One can imagine annihilations and replacements, ones not causally connected in any way, occurring at the break points.) Particulars are always changing in some degree, but while the particular exists it must *grow causally* out of its past.

Can we say more about the nature of the causation in-
volved? I think we can. W.E Johnson, who we have already
noticed for the distinction between determinable and de-
terminate properties in his three-volume *Logic,* also drew a
distinction between two types of cause (Vol. 3). He called the
one *transeunt* causation (going across), and the other *immanent*
(remaining within). Transeunt causation is the more ordinary
sort of causation, when one thing brings about something
in another particular (or *sustains* something, as when sup-
porting something or keeping it in existence) and it can be
argued that it is the only sort of causation that there is. But
I think that immanent causation is also actual. Spontaneous
emission from an atom of uranium 235, radioactive decay,
might be such a case. It is spontaneous because not pro-
duced by causal action from outside the atom. It doesn't
matter that probability rules in this emission case. Prob-
abilistic causation is causation when the law 'fires'. Does the
'spontaneous' suggest that there is no causation here? Well,
it obeys a probabilistic law so why should it not count as
a case of the uranium atom causing one of its constituent
electrons, say, to be emitted? It is this sort of causation that
I take to be operating when a thing persists. Russell does
not speak of immanent and transeunt causation, but does link
immanent causation with Newton's first law (Russell 1948,
p.475): 'a body at rest remains at rest unless acted upon by
some force'. (And equally can we not link transeunt caus-
ation with Newton's third law: 'action and reaction are equal
and opposite'?) Immanent causation, if we accept it, will
generally be a monotonous series of happenings where like
produces like.

Recapitulation. So far I have sketched the main themes
of my metaphysics. The world can be identified with

space-time, with 'space-time' operating as a placeholder for the cosmic reality that cosmology and fundamental physics seek to discover. It is best understood, I have argued, as a world of states of affairs (Russell's 'facts'). Although states of affairs involve particulars and universals, these 'constituents', as they may be called, are not capable of existence independently of states of affairs. Particulars and universals necessarily involve each other, an ontological necessity that lies at the heart of states of affairs, and so lies at the heart of reality. It is to be noted that these states of affairs are particulars, a point already appreciated by Russell (the 'victory of particularity' as I call it). Particulars are contingent beings – there is no contradiction in denying their existence – and since universals must be instantiated, universals and states of affairs are contingent beings also.

Universals are either *monadic* or *polyadic*, that is, they are properties or relations. Note that philosophers sometimes use the term 'property' to cover relations also. We can resolve this ambiguity, when it needs to be resolved, by speaking of monadic universals as 'non-relational' or 'intrinsic' universals. There is room for *complex* or *structural* monadic universals, whose constituents may involve relations, and even for the epistemic possibility that every universal is complex (structures all the way down). I have argued for the somewhat controversial position that relations that are universals are *instantially invariant*, that is, that they link the same number of terms (particulars) in every instantiation. Relations may be divided into *internal* and *external*. (There may, of course, be mixed cases.) The ontologically important relations, such as distance in space or time, are the external ones, that is, relations that are *not* necessitated by the terms involved. Internal relations are relations that hold of necessity

in virtue of the nature of the terms, the related things. They constitute no ontological addition to their terms.

Laws of nature hold in virtue of the universals involved in the states of affairs between which causal or other law-like connections appear to hold. In particular, they may be seen as connections that hold between states of affairs *types*: say, *something being F* bringing about that something, or, more realistically, some further being that stands in some spatial relation to the original something, bringing about *something's being G*. Such an account seems to generalize reasonably smoothly to the all-important quantitative laws and equations of empirical science. It also lends itself to a *Singularist* account of causation, but one where the instantiation of a law is an instantiation of the universals involved in the nomic (law-like) connection. Laws exist in their instantiations and nowhere else, and so are universals themselves, even if a rather special sort of universal. The account allows for a new justification of the inductive step from observation to the unobserved. It is an *inference to the best explanation* from the empirically observed instances to the 'strong law' that explains the regularity. It is, though, a *further* type of state of affairs in addition to the states of affairs that were originally postulated. (It is a *general* state of affairs in Russell's terminology.) But be warned: there is still another type of state of affairs to come before this sketch ends.

Universals are not to be postulated *a priori* nor on mere semantic grounds. There is no one–one correlation holding between general terms in our language and universals. Universals are to be postulated on the basis of our best empirical science.

But there is much more to be done if we are to have something that constitutes a systematic metaphysical position.

Many questions have to be answered. What about modality?: what is the nature of necessity, actuality, and possibility? What about the distinction between the realm of the *a priori* (mathematics and logic) and the realm of the *a posteriori* (empirical science)? What ontological problems are posed by the existence of these two bodies of knowledge? The latter, the *a posteriori*, perhaps does not lead into any major problems for my empiricist metaphysics, though the conflict insisted upon by Wilfrid Sellars, the *manifest* image of the world, the world of perception and common sense, on the one hand, and the *scientific image* presented to us by physics and cosmology, is real and pressing. (Something will be said about this in the last chapter, on the mind.) But here we can perhaps pass this by to be dealt with not in this sketch but by a comprehensive epistemology, though an ontologically directed epistemology. Before dealing with this, there are problems raised by the universal quantifier, and what is not quite the same thing the word 'all', the concept of totality. And there are still greater problems raised by negation and the word 'not', problems that have constituted a sort of fascinating nightmare for metaphysicians. These problems are now the subject of further discussion.

Chapter 8

Truthmakers

In my view the most promising development in recent metaphysical discussion has been the emergence of *truthmaker theory*. The truthmaker of a particular truth may be initially defined as that particular entity in reality in virtue of which that truth is true, and the force of this definition will emerge, as I hope, in the rest of this book.

A short historical account will not be inappropriate. The perhaps rather odd-sounding term 'truthmaker' (which I write without a hyphen) was coined twice, once by C.B. Martin (Charlie Martin) in the years when he was in Australia, where quite a lot of attention was given to the topic; and a second time by three English philosophers, Mulligan, Simons, and Smith in an article they published in 1984.[1] Martin's work was particularly interesting because he concentrated on counterfactuals (truths such as 'if he had read the warning, there would have been no accident' where he did not read the warning) that various philosophers used without making it clear what the truthmakers for these counterfactuals were.[2] Though there appeared to be no common cause, it was clear that the term was being used in exactly the same sense by the Australians and the three Englishmen. The two bodies of

[1] 'Truth-makers', Mulligan, Kevin, Simons, Peter, and Smith, Barry, 1984.
[2] See my *Truth and Truthmakers*, Chapter 1, 2004a. Chapter 2 discusses general principles that I argued should govern truthmaker theory.

thought flowed together harmoniously, at least to the extent that philosophers can be harmonious in their thinking.

We should notice, though, that Russell can claim to be the originator of truthmaking theory. In *Human Knowledge* (p.166) he speaks of the

. . . fact or facts which, if they exist, make a belief true. Such fact or facts I call the 'verifier' of the belief.

He never develops the point very far, and in any case 'verifier' is most unfortunate terminology. To a generation of philosophers in flight from the dreadful Verification Principle advocated by the logical positivists (roughly, a truth must be verified, or at least be verifiable, to be a truth) 'verifier' smacks of a theory that they are trying to get away from.

In my view truthmaker theory should be seen as a development of the correspondence theory of truth, the utterly naturally idea that truths are true if and only if they correspond to something in reality. Truths are made true by the real. The special contribution of truthmaker theory is the point that the correspondence of truths to reality need not be a one–one correspondence to reality. Consider for instance the truth that at least one human being exists. We don't need just one thing to be what makes this truth true. The relation is a one–many relation. Each human being that exists is, just by itself, a truthmaker for this truth. That is an easy one. But finding truthmakers for certain sorts of truths can be a difficult and controversial matter, as will emerge. Consider, for instance the truth that there is no elephant in the room. What is the truthmaker for this?

There are many good philosophers who make good use of truthmaker theory but deny that every truth has a truthmaker. They might deal with the elephant in this way. They are

not, as I am, a *truthmaker Maximalist.* But I think that this Maximalism flows from the idea of correspondence and I am not willing to give up on the idea that correspondence with reality is necessary for any truth. (By the way, do not confuse truthmakers with truth conditions, which will not be discussed further here. Truth conditions are just propositions thought to be important truths about selected entities, whereas truthmakers are realities, existences.)

One important thing to appreciate about the truthmaking relation is that it is an *internal* relation. The nature of the truth and the nature of whatever it is that makes the truth true are the only things involved in this relation. It is rather easy to overlook internal relations – there are so many of them and they are usually not of great interest. This may help to explain why the truthmaking relation is rather easily overlooked. In my view, then, having a truthmaker is not an optional extra but of the essence of what makes a truth true.

Those philosophers who work with truthmakers, but reject truthmaker Maximalism, face a certain problem. What theory of truth do they accept for the truths that lack truthmakers? As far as I know they have not discussed this problem. It seems likely that they would accept for these truths some version of a minimalist theory. The theory goes back to Frank Ramsey's paper 'Facts and Propositions' (F.P. Ramsey 1927). Ramsey observed that to assert that 'it is true that Caesar was murdered' is to assert no more than 'Caesar was murdered'. We can say 'what she said was true' and this saves us having to repeat her words. 'True' seems little more than a term of convenience on this view. A contemporary version of the theory is argued for by Paul Horwich in his book *Truth* (1990). The view of truth is minimalist. That so little can be said about such an important notion as truth is a reason to suspect this theory.

Returning to truthmaker theory, a quite important notion is that of a *minimal* truthmaker. (Nothing to do with the minimalist theory of truth!) A minimal truthmaker is one that is a truthmaker for a certain truth *with nothing to spare*. Sometimes where it is difficult or controversial to hit on a minimal truthmaker, it is useful to produce a less than minimal truthmaker. And it may be noted that every truth has *the whole of the world* as truthmaker, though indeed it is an uninteresting truthmaker, at least for most truths. It is also worth noting that if there is infinity anywhere in the world (a question to which I think we do not, perhaps even cannot, know the answer) then there are truths that *cannot* have a minimal truthmaker. Suppose that there are an infinite number of electrons in space-time. The totality of the electrons would be a truthmaker for this truth. But every second electron would also be a truthmaker or every nth electron provided n is a finite number, with no minimal truthmaker. (This elegant point was spotted by Greg Restall, 1995.)

The truthmaker for the truth 'at least one human being exists' is easy to decide. But the assigning of truthmakers can be a very controversial matter, even among truthmaker theorists. This is because the postulating of truthmakers is a move in metaphysics, and so is inevitably controversial. But such postulatings will be found of great use in our inquiries, even if they do no more than make more clear just what point is being contested. To ask a philosopher what his truthmakers are in some field should remind us of Quine's suggested question 'What do you quantify over?' To ask for truthmakers may be a better question than Quine's.

That will do as an introduction to truthmakers. But we need to consider also the other side of the truthmaking

relation: the *truthbearers*. I hold the perhaps orthodox view that the truthbearers are (true) propositions. But what are propositions? My view here may be less orthodox. I do not, as some philosophers do, believe that there is a realm of propositions that has 'abstract existence' in addition to space-time. I think that propositions are best understood as what appears after such phrases as 'believes that', 'supposes that', 'entertains the thought that', 'doubts that'. There is something abstract about propositions, but abstract in a more ordinary way than Quine's 'abstract objects'. I identify propositions as what is believed, what is supposed, entertained, doubted, etc. It is important to notice that propositions in this sense can include *impossibilities*. Hobbes believed that he had 'squared the circle'. But his purported construction of a perfect square with exactly the same area as a given perfect circle was a believing of something that is impossible. (Philosophers have a technical term for propositions of my sort: they call them 'intentional objects' of belief, supposition, etc. We shall meet them again in a discussion of the mind in the last chapter.)

Notice again that the truthmaking relation is an internal relation in the sense already introduced: given the terms, the truthmakers and the propositional truthbearers, the relation is given. The truthmakers, I think, necessitate the truths, that is, the truthbearers. This seems to be a matter of supervenience. Reality fixes the truths as true.

The Entailment Principle. I call attention here to a very important principle that flows from truthmaker theory. Suppose that a true proposition *p entails* a proposition *q*. By truthmaker Maximalism *p* has a truthmaker. According to the Entailment Principle, it follows that this truthmaker for *p* is also a truthmaker for *q*. It may not be a *minimal* truthmaker even if

the truthmaker for p is minimal. Note that this *must* be an entailment. If all that is true is that $p \supset q$, the so-called material conditional, then this result does not follow. Note also the importance of truthmaker *Maximalism*. If Maximalism is false – say it is false for negative truths as many philosophers hold – then the application of the Entailment Principle must be correspondingly limited. But entailment is transitive – it carries on – if p entails q and q entails r then p entails r and so on. This will prove to be important for our discussion of numbers and classes.

Something rather interesting can also be drawn as a consequence of the Entailment Principle. Philosophers have suggested, and it is quite an interesting idea, that in a valid argument (one that follows by necessity) the premises already contain the conclusion (though we may fail to make the deduction). This can be recast in truthmaker terms, where the matter seems clearer. In a valid argument the truthmaker for the conclusion is contained in the truthmaker for the premises. The conclusion needs no extra truthmakers. We will have much use for the Entailment Principle in the remainder of this essay.

One thing I wonder about is the status of this agreeable Entailment Principle. It is clearly, if true as I think it is, a necessary truth. But what sort of necessity is this? Is it an analytic truth, or is it something deeper? As in the case of the link between particulars and universals in states of affairs, I now think it may well be a necessity that is ontological.

Chapter 9

Possibility, Actuality, Necessity

One way of coming to grips with David Lewis' theory of possible worlds (though perhaps Lewis would not have accepted the point) is that he is providing truthmakers for true propositions that something is possible. It would be an ontologically very expensive way of providing truthmakers for these truths. By contrast, I suggest that truthmakers for possibilities can be provided at very low ontological cost. Let us in the first place confine the possibilities to what I call *mere* possibilities. A proposition p is a 'mere possibility' if it has the structure 'p is possible but not-p is true'. (In standard symbols: $\Diamond p \ \& \ \neg p$.) Thus 'it is not the case that I am sitting' is false since I am in fact writing at my desk, but 'it is possible that I am not sitting' is a true modal proposition because it is *contingent* though true that I am sitting at my desk.

But we can use Maximalism and the previously discussed Entailment Principle to get a striking result. Consider the class, presumably an immensely large class, of the contingent truths. Each member of the class has associated with it a modal truth *of its own*, the possibility that it is false. That is true because that is what the contingency of the member *is*. It is true by definition. At this point the Entailment Principle can be wheeled in. The possibility that p is false plus the contingency of p entails 'it is possible that not-p'.

So the truthmaker T for *p* (Maximalism ensures that there is a truthmaker) plus the contingency of truthmaker T (the truthmaker of a contingent truth is a contingent being, as argued earlier) entail the truth of it is possible that not-*p*. So T together with its contingency are truthmakers for the 'mere possibility' that it is possible that not-*p*. That, I suggest, is all that is needed as truthmakers for the mere possibilities. Let us call this the Possibility Principle.

This simple but extraordinary result shows, I think, that current analytical philosophy, no doubt under the influence of the work of David Lewis, has greatly overvalued the ontological importance of the category of possibility. Another way, perhaps easier, to see the truth of the Possibility Principle is to consider that mere possibilities supervene on the actual. It is fairly easy to see that given the actual world, these mere possibilities, indeed all possibilities but especially the mere possibilities, come with it *automatically*, at no ontological cost.

Indeed, we are now saddled with a small new problem. What is the value of these modal truths? Could we not hold that there is nothing to the possible except what is actual? I think, though, that the notion of mere possibility needs to be retained, for pressing pragmatic reasons. Counterfactual conditionals, that is, 'if . . . then's with the 'if' clause false, play a very important part in the regulation of *conduct*. We have free will, at least in the minimal sense of being able, on occasions, to *choose* between courses of conduct. Choosing is a psychological reality. We can think that if we do X then in all probability Y will be the result, whereas if we do not do X in all probability Y will not occur. Doing X and not doing X cannot both occur perhaps (say, sitting down or standing up), so that one of them is a *mere* possibility. Afterwards, what was

actually done may give us useful lessons for what we should do if a similar situation should arise again. We are forewarned or forearmed as the case may be. So possibilities can be extremely important in considering lessons for future action. Again, the progress of science demands hypotheses, some of which inevitably turn out to be mere possibilities. Still further, the whole life of the mind, art, and culture involves continual trafficking in mere possibilities, as in storytelling and other cultural activities, some of which, paradoxically, can lead us to deeper truths.

It is worth noticing that counterfactuals are naturally entertained with respect to *first-order particulars*. This is because of the complex and easily varied and changeable nature of the particular space–time worms that we identify as particulars. It is therefore very easy to come to believe or entertain counterfactual propositions about such objects that turn out to conflict with later experience. Contrast this with universals, strictly identical in different instantiations as they must be, and subject to the laws of nature. It is not so easy or natural to entertain counterfactuals where the universals are thought of as different from the way they actually are.

So much for possibility as a metaphysical category. The actual can be dealt with fairly easily. The actual may be identified as existence, as being. There are, I think, no grades or levels of being. There is, as John Anderson at Sydney used to put the matter, just one way of being, a phrase I have heard on the lips of David Lewis after he had been introduced to this formula. And there are no non–existents. Notice that being, existence, has no special link to the present, and at a later point I will give reasons for rejecting the now rather widespread doctrine of Presentism, the position that only the present exists. The actual is of course possible, but this is a rather trivial entailment.

I turn now to necessity. What is necessary is actual, but, of course, what is actual need not be necessary, it can instead be contingent. Some necessary truths are analytically or conceptually necessary, though I do not think that this is the case for all necessary truths. I propose in the first place that the truthmakers for analytic truths are the meanings of the words or symbols in which these truths are expressed. We are all familiar with the point that analytic truths are not about meanings. The point is correct; that is not what they *refer to*. But being an object of reference is one thing, being a truthmaker is another. So my proposed truthmaker is in no conflict with the idea that analytic truths are true solely *in virtue of* the meanings of the words or symbols in which they are expressed. It is interesting to note that A.J. Ayer said *exactly* that about analytic truths[1] in his famous book *Language, Truth and Logic*. But because he had no inkling of truthmaker theory he was not able to see the depth of his own remark.

All of this, of course, is not to say how large or how small the class of analytic truths is. That class may be relatively small. That is something that remains to be settled, and it isn't all that easy to settle it. Nor does it give us any *theory* of meaning. That is a very difficult matter, as philosophers all know, and I have nothing to add here. But that words and symbols do have meanings is, I take it, a Moorean truth, a commonsense truth that we can hardly deny, though we can try to analyse it. Why then cannot we take these meanings to be the truthmakers for analytic truths?

Notice that these remarks seem to hold for conceptual truths also. They are true solely in virtue of the concepts

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[1] 'I hold that a proposition is analytic if it is true solely in virtue of the meaning of its constituent symbols, ...' Ayer, 1947, p.16.

used to express such truths. Concepts here are taken to be psychological entities, but again I offer no particular theory of what they are beyond their mental nature.

But are all necessary truths analytic or conceptual? That is very hard to believe. I have already argued that the instantiation of universals and the rejection of unpropertied particulars constitute necessities that seem to be neither analytic nor conceptual, and with less confidence have suggested that any universal *must* stand in law-like relations to at least one further universal. I have also suggested that validity of argument may be something more than analytic or conceptual necessities. These necessities, if they are necessities, ought, I suggest, to be conceived as something ontological, a necessity in the nature of things. It seems possible that there are others. In particular there is the great, ever-growing, edifice of mathematics with its apparatus of axioms and proofs that yield a certainty that, if not absolutely certain, is the most certain knowledge that we possess. Can that all be merely analytic or conceptual? Surely some stronger truthmaker is required? Picking up here on a suggestion made to me in correspondence by Ross Cameron, may there not be foundational necessities that support these huge structures, even if these necessities are quite restricted in number? Non-contradiction, excluded middle, and perhaps other principles may be of this nature. It is for logicians to advise on the detail here.

The necessities which I suggest above are to be found in the world are all of them relational in nature. They link particulars to universals, universals to further universals, or proposition to proposition. But are there any *beings* that exist of necessity? There are candidates. Some philosophers hold, not only that there is a God but also that God is a necessary being. An interesting point here emphasized by Leibniz is

that if a necessary being is a possible being, then it exists. Just as a necessary truth is true 'in every possible world' so a necessary being would exist 'in every possible world'. Those philosophers who do not believe that there is a necessary being or beings, must therefore hold that a necessary being is impossible. That is the view that I support.

But there are other candidates for necessary beings, in particular numbers and other mathematical objects. Do not the natural numbers, say, and including the infinite cardinals, necessarily exist? I claim, however, that the only things that exist are *instantiated* numbers, numbers instantiated in structures in space-time: so many electrons, so many uranium atoms, so many human beings, and so on. Suppose that space-time is finite in every dimension, that there is no infinite collection of things and no infinite divisibility in things either. As far as we know this could be true. Then the infinite numbers would none of them be instantiated, and so would not exist. Planck's quantum (unit) of energy may point to the fact that nothing is infinitely divisible. It is no doubt *possible* that the infinities should be instantiated, but, as already argued, to be possible *and no more* is not to have being. The topic of number will be taken up again at a later point.

Could there be nothing at all? Philosophers worry about whether there could have been nothing at all. (One might reasonably wonder whether anybody but philosophers could take an interest in this topic!) Our reflections on the ontology of necessity together with the Possibility Principle can, I think, help us here. Note first that if there are any necessary beings, then a completely empty world is impossible. I've suggested above that there are no necessary beings, but even if this is mistaken there remains the question 'Could

there have been no contingent beings?'. Let us consider the presumably true proposition 'at least one contingent being exists'. It is very easy to find truthmakers. Any contingent being will do as a truthmaker! Then the associated modal proposition will be 'it is possible that not one contingent being exists'. By truthmaker Maximalism, this truth will have a truthmaker. By the Possibility Principle this truthmaker will be the same truthmaker as exists for the truth 'at least one contingent being exists'. So, if there are no necessary beings, then there could have been nothing at all, a truth that has a this-worldly truthmaker. The possibility is, as we know, a mere possibility. One can still, of course, ask *why* there is anything at all. In the event that the space-time world turned out to have an immanent teleology, a rather unlikely possibility I would judge but one I do not absolutely deny, we might even have a naturalist yet positive answer to this 'why' question.

I add a quick note on the modal but derivative notion of *impossibility* – the not possible. There are, of course, truths of impossibility, for instance 'it is impossible for something to be at the same time round and square'. It is gratifying to see how easily truthmakers can be provided for such a truth: the properties of roundness and squareness.

Chapter 10

Limits

We come now to one of the most difficult questions in metaphysics, a question that has been with us at least since the days of Parmenides. What should our metaphysics of negation be? Let us begin by looking at four attractive propositions put together in an article by George Molnar (Molnar 2000):

(i) The world is everything that exists
(ii) Everything that exists is positive
(iii) Some negative claims about the world are true
(iv) Every true claim about the world is made true by something that exists.

These truths, it seems, cannot all be true together, which is why the putting of these four propositions together is so useful. Molnar offered no solution to the problem. (i) cannot be tinkered with, I think. (iii) seems plain commonsense – I am saying something true when I say that there is no rhinoceros present in my study. (iv) is truthmaker Maximalism. Although many philosophers who are sympathetic to truthmaker theory have sought to soften (iv), it is a proposition that I am most unwilling to give up. So I have to try to soften (ii).

Let us begin by introducing C.B. Martin's distinction between *limits* and *absences*. Limits set bounds to things – the persons in this room now, or to what exists, and all sorts of bounds, trivial or important, between these two cases. They

link up with the universal quantifier (∀) or more simply and accurately the word 'all'. Russell in the lectures on Logical Atomism called these 'general facts' but said he was not sure what the form of such facts should be. Absences are even more straightforward, the absence of a rhinoceros from this room, for instance. Russell called absences 'negative facts', and it was his arguing for these sorts of facts that he said caused a riot in the class when he put forward the case for negative facts in Harvard.

Russell later saw that one did not have to postulate negative facts – states of affairs – provided that one had a satisfactory account of general facts. General facts still involve negation – they could be called 'no more' states of affairs, so here is the point where I think negativity must be allowed. But our first task is to develop a theory of general facts, Martin's limits, which I shall call from this point on *totality states of affairs*.

Totality states of affairs. Because one can use the logician's quantifier '∀x' without necessarily implying that what is being quantified over, the x, exists, the quantifier is not quite right for our purposes. What we want really is just the ordinary word 'all' as in 'all the human beings in the world' or 'all the water on Earth'. To make true statements involving such phrases, there must be human beings or water. I call these 'totalities' or, using a made-up word, 'allnesses'. The first point to insist upon is that these totalities are perfectly objective. 'All the persons in this room now', for instance, is a perfectly objective totality as is 'all the water on Earth'. I've argued earlier that we are actually able to *perceive* causality, in particular in the perception of forces acting on our body or when we are aware of the operation of our own will. Now I point out that we can *perceive* totalities, in the strict

perceptual sense. For instance, we can look into a bird's nest and perceive that there are *just two* eggs at present in the nest. (A case suggested to me by Peter Anstey.) It may be in such a case that we are, unconsciously, using as a principle 'if there had been more than two eggs in the nest I would have perceived more than two eggs, but I don't perceive any more and am in a position to perceive the more if it were there, so . . .'. But ordinary perception is full of these sorts of 'animal inferences' as Russell called them (1948, pp.182 ff.). At any rate, as a result of my perception, I *know* that there are no more eggs in the nest, and this is Moorean knowledge, that is to say, it is very much more certain than any argument that a philosopher can bring forward to argue that we don't have knowledge in such a case!

So there are totalities in the world, objective totalities, and it seems that the ontologist ought to take notice of this fact. For the notion of a totality is a topic neutral affair and there are all sorts of totalities extending throughout being. It seems that there could even be infinite totalities, such as the totality of electrons. We don't know whether there are, or are not, an infinity of electrons, but either way there is a totality of electrons. There is even a totality, it would seem, of the natural numbers, an infinite totality that is less than the infinite totality of the real numbers, though this, as we will see later, demands care.

How do totalities and classes stand to each other? Some classes seem to be closely linked to totalities. By 'the class of electrons' we mean 'the class of *all* (and only) the electrons'. But 'all the water on Earth' is a totality that is not a class, though the singleton class of the object {all the water on Earth} is near at hand. (This was pointed out to me by Graham

Nerlich.) We will, however, leave aside a consideration of classes for the present.

If there are totalities, there are truths about them, and we can inquire what sort of truth they are. How should the truths be analysed, or at least what form do they have? And for somebody who is a truthmaker Maximalist, what are their truthmakers?

At this point it is convenient to introduce *mereology*. Mereological wholes and parts are the simplest sorts of relations of parts and whole. Their relations are given by the rather simple *mereological calculus*. For metaphysicians there is an ideal philosophical introduction: Chapter 1 of the book *Parts of Classes* by David Lewis (1991), though his monograph becomes difficult in the later chapters. A doctrine that Lewis puts forward, and that I accept, is quite useful for my argument here. It is the thesis of *unrestricted mereological fusion*. 'Fusion' is just the mereological putting together of two or more entities to make a whole. Fusion is unrestricted, any entities at all can be 'fused', that is, they can make a whole. The whole consisting of Sydney Opera House and the number 42 is a perfectly good fusion, as are any other entities. At the same time, Lewis argues, and I assent again, mereology is ontologically innocent. Take the fusion of some cats:

Mereology is ontologically innocent . . . The fusion is nothing over and above the cats that compose it. It just *is* them. They just *are* it. Take them together or take them separately, the cats are the same portion of Reality either way.   (Lewis, p.81)

Returning to totality truths, I re-emphasize that the pioneer in this whole line of inquiry was Russell in the *Lectures on Logical Atomism*. He called the truths involved *general truths* and said that corresponding to these truths general facts

are required, a special sort of fact (states of affairs in my terminology). However he said he did not know what the form of the fact was, though he would like to see the question studied. So here we are, ready to try to carry on his good work.

We can, it seems, pick out two aspects of these totality states of affairs. There is first the sort of thing that is being totalized, which we can call the totality's intension, and second there is the whole of the things collected, the extension as it is natural to call it. The first aspect would appear to be a property. But we can't make this to be a first-class property, a universal, except in very favourable circumstances. In the bird's egg case, there is a fact, a state of affairs, that these are all the eggs in the nest now. Of course there is no universal of *being an egg in this nest now*. But I think that will do for the property that does the totalizing. The extension, the whole, will be the mereological sum of the eggs in question.

You can think of the property as cutting the mereological sum up without remainder, like a cookie cutter. In this case, there is a neat division into two non-overlapping objects, the eggs. In some cases, though, there will be overlaps. In the case of all the water on Earth you won't get any neat dividing at all. But you do have a mereological sum of lots of bits of water that sum to the totality of earth's water, and there is a property handy: 'quantity of Earth water'.

Here is another way of thinking about it: the property totals ('alls') the mereological sum. This is a state of affairs, a relation that holds between the property and the mereological sum, but it is not a state of affairs of the sort we have met with so far. It seems needed, though, because the world is teeming with totalities. The world itself is a totality, the totality of existents or beings. Since we are not demanding universals, I

think we can accept *existence* (or perhaps positive existence) as a property for the world-total. (Neither existence nor positive existence are universals, it would seem. They are too general.) Alternatively we can go to the world-property, a property that we have already met. It picks out the world as its only instantiation, and this is a totality state of affairs.

A difficulty has been raised for these new sorts of states of affairs. Are they not *additions to being*? In the case of the world, to take it as an instance, does not the new state of affairs need to be included in what there is? There is the world, then, it is argued, there is a state of affairs that this is all there is. Don't you have to add it to the world? You can readily see that a nasty regress can then be produced that goes to infinity. It seems to be present for all totality states of affairs.

I used to have a solution, a bad one, to this problem. I accepted the regress but argued that the regress was a regress of propositions, but not a regress of beings. My model was the truth regress: if *p* is true, it is true that *p* is true, true that it is true that *p* is true, *ad infinitum*. But, I said, in the truth regress the *truthmaker* is always the original truthmaker for *p*. The truthmaker never changes as one keeps adding 'it is true'. I think all this is correct. But I then wrongly suggested that the same was the case for totality truths. (See my *Truth and Truthmakers* for this mistake: 6.3.1.)

I never quite trusted this solution. I now give a different answer. It seems to me now that I also had failed to see the point that totality states are *not* additions to being. *They introduce negation into the world*. They introduce it in the form of *limit*. They say of something *that's all*. If you claim truly that '*a* and *b* and *c* and *that's all*' you haven't added to the world with the 'that's all'. You have indicated that things are limited in some respect. The supposed first step in the regress

would be to bracket (*a*, *b*, and *c* and that's all), and then say again 'that is all'. But that seems to be nonsense. If you have (*a*, *b*, *c* and that's all) then adding another 'that's all' seems to get you nowhere, unless you are just referring again to *a*, *b*, and *c*. A fact of limitation does not add. It 'says' that after *a*, *b*, and *c* there are no more. That's not an addition of being.

An interesting case that may help to see my mistake is to consider the totality of being. It seems that there has to be an ultimate totality state of affairs, an 'everything' state of affairs. I accepted and still accept that there is such a state of affairs. But in the past it still seemed to me that this was an addition to the ordinary states of affairs, so I had to talk fast to try to prevent an infinite regress arising. But a cutting-off of all state of affairs is no addition. 'No more' is not something more! The cost is, a cost I suggest must just be paid, that negation in the shape of 'no more' must be admitted into our ontology. Limit is real. It is an ontological feature.

Philosophers don't like not-being. (Was Father Parmenides, as Plato called him, the culprit?) Russell said that his class at Harvard nearly rioted when he tried to argue for not-being in the form of negative facts. Maybe the class had a point if one is thinking about *absences* as Russell was then. But if you see them as *limitations* then I think you have to accept that there are such things. We even perceive them, as I have pointed out in the case of the eggs in the nest. So here is a new sort of state of affairs. It can be symbolized as Tot (property X, mereological whole of the Xs). That is its form.

One thing that may seem unsatisfactory about limit states of affairs is that at first glance they seem to falsify the Eleatic Principle, which seeks to find a (positive) causal role for everything that we postulate in our ontology. But if we avail ourselves of the rather wide interpretation of the principle that

the word 'role' gives us, maybe we can blunt this difference. Consider what would have happened if limits were not just where they actually are. Put one more, or one less, electron in the world. The new player or the absence of a player would change the game, a little at least, because it would have acted causally to bring about changes elsewhere (somewhere). Or that is what the laws of nature seem to tell us. So it, the actual electrons, all of them, make a difference, and so are responsible in some degree for the way the world goes. That, I suggest, is enough to say that *just that limit* has a causal role. These counterfactual truths would fail for epiphenomenal entities. But I've already suggested in Chapter 1 that if there are such entities we can know nothing about them, and so we may be entitled to assume that epiphenomenal entities do not exist.

Chapter 11

Absences

This brings us to the hard one: absences, which were what Russell was presumably arguing for at Harvard. To say that there is no rhinoceros in the room (indubitably true) goes beyond a limit and proclaims an absence. You might try saying that it really only limits the number of these animals, and so it is a limit fact. But you can't limit what does not exist, and a rhino in the room is a non-existent. If you worry that after all there are such animals and this room is simply off-limits to rhinoceroses, change the example to a unicorn. But I think the rhino case is an absence all right. 'There is only one rhino in the room', if that were true, would be a limit case, but 'there is no rhino in the room' is not.

Absences are really rather horrible, ontologically speaking. There are so many of them, and they seem never to have any causal power if you spell out the causal chains involved. Phil Dowe, in important work, distinguishes between *preventions* and *omissions*. With prevention a certain thing is prevented, and so does not exist. It is absent. With omissions something does not happen and so does not exist. It is absent. Dowe argues that both involve *counterfactuals*. The father grabs the child and so the child is not hit by the car. If the father had not done this, then the child would have been hit by the car. The non-existent thing that was prevented has no causal efficacy. Suppose the case is that the father failed to grab the

child, and so the child is hit by the car. The counterfactual is then reversed, the non-existent thing, the omitted thing, is grabbing the child. It also has no causal efficacy. We do use causal language in connection with preventions and omissions. But if we are concerned with ontology we should treat them as second-class cases of causality. (See, with much more useful detail, Dowe 2000, Chapter 6.) A further point is this. Suppose we are given all the real causal relations in the world. It seems that then we are automatically given all the preventions and omissions. They are nothing additional, they supervene. Consider, for instance, a billiard table with balls moving around it, sometimes hitting each other. Once you have all the motion of all the balls and their hitting each other then you also have the preventions and omissions that occur.

Limits, I've argued in the previous section, do seem to have some causal effects. They are better than absences in this respect. I think that we can use limits to curb absences. 'All' can be used to tame 'not'. But I'd be prepared just to accept absences into my metaphysics if the argument which I now present does not work. One thing I am going to use is the really instantiated but internal relation of *difference*. (Here I am to a degree following Plato in his discussion of not-being in his great dialogue *The Sophist*.)

Consider this room. There is no rhinoceros in it. How shall we provide a truthmaker for this truth? Given totality states of affairs we can do this. Take *all* of the room down to its most minute parts. The *all* is essential. Is it not true that *each* part of the room is *different* from a rhinoceros? The states of affairs that make up the room are all of them different from rhino states of affairs. Under these circumstances, there is no rhinoceros in the room. So cannot the room, *all* the

room, act as truthmaker for the truth that the room is rhino free? No bit of the room is a rhinoceros, however small the rhinoceros is.

There seems to be a problem if we change the example and say that there is no unicorn or centaur in the room. The trouble about unicorns and centaurs is that they don't exist and so, it would seem, cannot be terms for the relation of difference, which demands two terms. They can, however, be dealt with in a slightly different way, but one that still uses limits. Take the unicorns first. It is true that no horse-like animals are single-horned. So let us take as truthmaker the totality of horse-like animals. None of them is single-horned. They are each of them *different* from single-horned creatures. So this totality of the horse-like animals can be the truthmaker for the non-existence of unicorns, and *a fortiori* for their presence in this room. It is interesting to note that the totality of single-horned creatures (rhinos together with the other single-horned animals that there are) would also serve as truthmaker. We get two different truthmakers for the one truth. But I think that truthmaker theory need not worry about that. Truthmaking relations need not be one–one and in this case they are not. Two different truthmakers for the same truth, even two minimal truthmakers, is not objectionable.

The absence of centaurs from anywhere (and so from the room) can be dealt with in the same way. No humans are half-horses so the totality of humans can be a truthmaker for the lack of centaurs. The other truthmaker is the totality of the horses – none of them are half-human. One thing to notice is that, in general, very big truthmakers are required to be the truthmakers for negative truths. I think this helps to explain the difficulty of proving a negative. That you didn't

commit the crime, for instance, may require the totality of your acts on the fatal day as truthmakers. Hume remarks on the difficulty of proving a negative in his *Treatise of Human Nature*.[1] Now, we see, truthmaker theory is in a position to give an ontological explanation for Hume's epistemological insight.

One might think that for truths such as 'there are no unicorns' and 'there are no centaurs' the simplest thing to do is to offer the whole world as their truthmaker. Contemporary logic, after all, would offer us '($\forall$x) x is a non-unicorn' (or non-centaur) as the logical form of these truths, and these propositions are propositions about everything. And I would not deny that the whole world is a truthmaker for these truths. But is it a *minimal* truthmaker? I don't think so. Huge swathes of the whole world are really irrelevant to the non-existence of these animals. It is with the horses or the horned animals for the first truth, with the horses and the humans for the second truth, that the truthmaking action is found. I'm pointing to *minimal* truthmakers, of course.

Before leaving this section I'll come back to Russell. I might have known that Russell would be there before me. I think he made essentially the same point as mine, although he did not have the useful jargon of truthmakers, some time after his *Logical Atomism* lectures. It was in his introduction to the second edition of *Principia Mathematica* (p.xv). He saw the essential point that 'all' could be used to get round 'not':

Given all true atomic propositions, [*These are all supposed to be positive*] together with the fact that they are all, every other true

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[1] Selby-Bigge edition, p. 212. Hume writes: 'I confess it will be somewhat difficult to prove this [a thesis of Hume's] to the full satisfaction of the reader; because it implies a negative, which in many cases will not admit of positive proof.'

proposition [*including the negative ones*] can theoretically be deduced by logical methods. That is to say, the apparatus of crude fact required in proofs can all be condensed into the true atomic propositions together with the fact that every true atomic proposition is one of the following: (here the list should follow). If used, this method would presumably involve an infinite enumeration, since it seems natural to suppose that the number of infinite propositions is infinite, though this should not be regarded as certain. In practice, generality is not obtained by the method of complete enumeration, because this method requires more knowledge than we possess.

I thank that redoubtable Russell scholar, Herbert Hochberg, for pointing out this passage to me.

Aliens. The truthmaker apparatus that we have now got enables us to deal with a teasing little problem, one that I mishandled over the years, the problem of what David Lewis called 'aliens'. It seems possible that there might have been properties and relations that do not exist in the world nor are combinatorially constructible from the properties and relations of the world. Again, there might have been particulars that do not exist in this world and are not combinatorially constructible from particulars that exist in the world. Lewis, of course, had a place for aliens, they were good citizens of other possible worlds. But what truthmakers can the one-world chauvinist such as myself give for truthmakers for what seem to be true modal propositions?

If we keep totalities in mind and the Possibility Principle, then the solution is not hard to discover. I will take a particular case. Suppose that there are simple properties, and consider the possibility, as it seems to be, that there might have been other simple properties besides the ones that exist. Collect all the actual simple properties (they might be infinite

in number, but still they have their 'fusion'). Remember that properties are contingent beings. The proposition we want to give a truthmaker for is the modal truth: 'there is the possibility that it is not the case that this collection of simple properties are all the simple properties.' Note that this is not just an epistemic possibility. There actually are no more simple properties, we are assuming. But the Possibility Principle says that if p is contingent and has a truthmaker, then that truthmaker is also a truthmaker for the modal truth 'possibly not p'. So the collection, the totality, taken as a totality, is truthmaker for the contingent truth that these are indeed all the simple properties. But then it will also be, by the Possibility Principle, truthmaker for the possibility that this collection is *not* the totality of the simple properties, i.e. alien, extra, simple properties are possible (though not actual by definition).

Chapter 12

The Rational Disciplines: Logic and Mathematics[1]

The disciplines of logic and mathematics are different from the empirical sciences. They issue in truths that are necessary and discovered *a priori*, and, with the exception of the axioms, they can be *proved*. All of this sets them apart from the empirical sciences, and creates problems for empiricist philosophers. A variant of Kant's question at the beginning of his *Critique of Pure Reason* then raises its head: how are these sciences possible? It is, though, a worry somewhat more extensive than Kant's question, which asked how is synthetic [non-analytic] *a priori* knowledge possible.

Quine denied that there is any such distinction among truths as the necessary/contingent distinction. But logic and mathematics seem to be sharply different from the empirical sciences. In these disciplines you can get *proof*, and get extensive *a priori* knowledge, but you can't do that in the empirical sciences (however much mathematics is used). We have to explain this difference. I suggest, against Quine, that we cannot explain it away.

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[1] In recent years I have worked with Anne Newstead and James Franklin to defend an 'Aristotelian' philosophical account of mathematics. I'd call attention to their paper 'Indispensability without Platonism' (forthcoming). It strengthens the case for using truthmakers to denote metaphysical commitments rather than Quine's proposal to signal these by quantification.

I think it is right to think of pure mathematics as a science of *structures* but certainly not of any old structure. The structure must be completely abstract, that is, completely topic neutral. It may be quite simple, for instance a class, but it may, of course, be very complex. One particularly difficult sort of case, speaking philosophically, is the mathematics of the infinite. Cantor, using a beautiful diagonal argument, showed that the infinity of the natural numbers is a smaller infinity than the infinity of the real numbers. Apparently, we can know *a priori* that there is infinity in the world, and even that there are different infinities that can be ranked as greater or lesser. What is the empiricist philosopher to say about this?

My suggestion is that we ought to draw a distinction between instantiated and uninstantiated structures in mathematics just as I do for universals. The instantiated mathematical structures are instantiated at some place and time in the space-time world. It will be real things, concrete things, perhaps fundamental particles, that instantiate the mathematical structures. They are what exist. The uninstantiated structures do not exist. They are merely possible structures. The epistemology of the thing, determining whether a certain mathematical structure is or is not instantiated somewhere in nature could be horribly difficult. Leave that aside because it is not a problem we need to solve here (or elsewhere perhaps). But the ontological distinction seems straightforward.

We may call this position Possibilism in mathematics. It does involve a cost, the cost that an existence proof in mathematics gives us something less than one might hope for – it is only, I'm arguing, a proof of possibility. But it saves us from abstract entities! The hypothesis that space-time is the only existent can continue to be upheld (though of course not proved). I suggest that Possibilism should be extended even

to set theory. Does this Possibilism commit us to a potentially huge range of possibilities? Perhaps. But remember that we can appeal to the Possibility Principle argued for earlier to show that the ontological cost of *mere* possibilities, which are all that is needed, is not at all high. It is almost a free lunch.

But this by itself will not account for the *a priori* nature of proof. My suggestion for explaining this is to appeal to the Entailment Principle in truthmaker theory, which, it will be remembered, holds that if *p* entails *q* then a truthmaker for *p* is also a truthmaker for *q* (not necessarily a minimal truthmaker). Entailment is also *transitive*, we noted, that is if *p* entails *q*, and *q* entails *r* then *p* entails *r*. So if we have a chain of valid (necessary) deductions the truthmaker of the premise or premises will be truthmaker enough for the subsequent deductions, even if the chain stretches to infinity.

The getting of new results in these rational disciplines proceeds by *proof*, and the steps in the proof are necessary given the premises, i.e. we have entailment as the proof goes forward.[2] Then we can say that no new ontological entities are introduced by the proof. It is true that from time to time, perhaps in the course of the proof, new entities may be introduced, and defined. Perfect circles, for instance, were the subjects of investigation by the Greek mathematicians together with the number π. It may be that nothing in the space-time world, including the world, instantiates a perfect circle or instantiates π. If that is so, then strictly perfect circles cannot be part of our ontology. But they will still be possibilities. We can understand what the world would be like if they did exist, that is, if these expressions did have

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[2] Even Gödel's famous incompleteness theorems for systems of axioms for arithmetic proceed by a deductive argument, that is, by *proofs*.

truthmakers. Then we can reason hypothetically, provided we reason deductively.

Some philosophers have suggested that in proof the proposition proved is contained in the premises. This is a suggestion difficult to evaluate. But if we shift to truthmakers we can shift to the claim that the truthmakers for true premises are sufficient truthmakers for the truths proved. This is a striking ontological economy, an economy given us by the Entailment Principle.

We do, of course, have to recognize that introducing the Entailment Principle drives us back to consider the axioms from which mathematical systems are developed. Given a set of axioms, we may argue that they are contingently true or contingently false, necessarily true or necessarily false. 'Necessarily true' is the particularly plausible view! There are then three possibilities, it seems. They might be analytically true, that is solely true in virtue of the meanings of the words or symbols used to state the truth. They might be conceptually true, true in virtue of the mental concepts used to express them. Or, finally, they might be true in virtue of principles that are fundamental necessities in the world, perhaps non-contradiction, excluded middle, and such like. The first two 'possibilities' are, I fear, too arbitrary and conventional. I have already found it necessary to postulate a necessity in the world to explain how particulars and universals demand each other, and so make states of affairs that are the least thing capable of independent existence. Perhaps in the rational sciences we should recognize similar necessities. I've already suggested that this is the case for the Entailment Principle itself.

Laws of logic and mathematics. We have discussed laws of nature. I suggest that we should postulate laws in logic and mathematics (non-contradiction, excluded middle in logic,

Peano's axioms for number, or whatever laws logicians and mathematics wish to postulate). In the light of the nature of proof just argued for we might suggest that such laws might be all we needed to postulate in the way of an ontology for logical and mathematical entities. These laws, if they are true laws, will be necessary rather than the contingent laws of nature (as I have argued the latter to be). One advantage of laws is that they assist in the project of instantiating (in space–time) all actually existing entities. For uninstantiated entities, laws can serve to explain the lure of the uninstantiated cases. They do this just as laws of nature serve, by acting as truthmakers for the counterfactuals having this form: if such and such entities had existed then they would have had such and such a nature. This, besides the economies it offers, promises to save us from having to postulate Platonic entities in addition to the empirical world!

As I have suggested already, there is the further question just what the truthmakers for these laws are. My present disposition is to see them as objective necessities in the world. But some more reductionist account may be tenable.

Chapter 13

Numbers

A metaphysics that aspires to a reasonable completeness must give an account of numbers. They are not the only mathematical entity, but they are central to mathematics and they are entities that philosophers have often discussed. Classes are nowadays thought to be fundamental to mathematics and so they also deserve discussion. I begin with numbers, starting with the natural numbers. My views on number evolved in discussions with Peter Forrest, and I used to think of it as the Forrest-Armstrong theory. We were later shown by John Bigelow that the same sort of theory was held by Isaac Newton. Still later there was the suggestion from James Franklin that we were close to Aristotle's account.

Suppose that there are seven black swans on the lake now. We want, you may be surprised to learn, a property and a mereological sum. The property in this case is a very second-rate sort of property: *black swan at present on the lake*. The mereological sum is the sum of these black swans. The property and the mereological sum are terms of a relation, and our claim was (and is) that the *relation* is an instantiation of the natural number 7. The property can be thought of as a 'cookie cutter' that cuts the mereological sum into just 7 black swans. (But notice that this neat division will not hold for every case. Consider two

delineated squares on a surface where they overlap and where the overlap is itself a small square. There are three delineated squares.) Notice that the relation is an internal one. It holds solely in virtue of the nature of its two terms: the property and the mereological whole of these swans in this case. A special feature of the natural numbers is that they have a link with *classes*. That is not surprising. Classes are classes of *ones* (their members) so they will have a natural number, though perhaps the number for some classes is an infinite one.

Notice that the number is instantiated. If you get to one of the infinities it may be that the number is so big that nothing can instantiate it. There remains the possibility of instantiation (there are no impossible numbers, I assume) and this is enough for mathematics, which, as I have argued, requires only the *possibility* of instantiation.

The rational and the real numbers can be captured in a similar way, and it is an advantage of this theory that it gives analyses of these three sorts of number that allows their resemblance to be captured, something that is not done by the Frege-Russell theory (for which see Russell's *Introduction to Mathematical Philosophy*, Chapter VII).

With the rationals and the reals we have only to shift to proportions. The cookie cutter is some fixed quantity – the unit – that 'measures' the thing to be measured. The unit might be a pound and what is measured, potatoes say, may be ½ a pound. This ½ relation instantiates one of the rational numbers. The unit might be the radius of some circle and the thing measured might be the area of the circle, $\pi\, r^2$, a real number that will be instantiated only if there are perfect circles in the world.

I now point out that all this was largely anticipated by Isaac Newton and Aristotle. Newton wrote:

By *Number* we understand not so much a Multitude of Unities, as [i.e. 'but'] the abstracted ratio of any *Quantity*, to another Quantity of the same kind, which we take for Unity.   (*Universal Arithmetic*, 1769. Quoted in Bigelow and Pargetter, 1990, p.60.)

(A Multitude of Unities is, presumably, a many-membered class.)

Aristotle said:

'the one' means the measure of some plurality, and 'number' means a measured plurality and a plurality of measures . . . The measure must always be some identical thing predicable of all the things it measures, e.g. if the things are horses, the measure is 'horse' . . . (*Metaphysics* 1088a 4−9, trans. W.D. Ross)

So Forrest and I were just going back to a 'classical' conception of number. Following Aristotle, there have to be *things*, entities in the world, that are numbered. If there is no such thing to be numbered, perhaps because the number is too big, then the number is not instantiated and strictly it is only a possibility. This need not worry the mathematician, of course. 'Existence' for mathematics, I have argued, depends only on the possibility of instantiation. Provided there is a proof, the truthmakers for the axioms from which this proof starts, plus the Entailment Principle, will provide truthmakers for the possibility, and that is all that is needed.

We do need, though, to consider a little more closely what it is to say that a number or other mathematical entity 'is instantiated'. Suppose that a certain particular at a certain time is exactly nine kilos in mass. Are we to say that there is a universal 'nine' instantiated by this particular? That does not seem right. All we seem to need is the universal *being*

nine kilos in mass. The number 9 needs, as it were, to be fleshed out in a concrete existent. The pure mathematician has to abstract the number 9 in thought from the state of affairs. It cannot be instantiated on its own. That is a false abstraction.

Chapter 14

Classes

David Lewis in his monograph *Parts of Classes* (1991) pointed out something that seems very important for the ontology of classes. Many-membered classes, he argues, are no more than mereological sums of singletons (unit-classes) of their members:

{a, b, c, d, . . .} is identical with {a} + {b} + {c} + {d} . . .

where '+' is mereological addition. Given this, the relation of a class to any sub-class turns out to be mereological. This account of many-membered classes may look strange at first sight, but I think that it really gets to the bottom of the nature of many-membered classes. For are not such classes just collections of ones? (Multitudes of Unities, in Newton's inspired words, if they are his own.)

This led Lewis to consider the nature of singletons, unit-classes, which he expressed great puzzlement over, heading one section of his book 'Mysterious Singletons'. He found them so puzzling that eventually he proposed what he called a 'structuralist' account of them. He meant that they could be interpreted as being different sorts of entity in different contexts. He also insisted (rightly, I think) that we have to make a distinction between an entity and its singleton, between x and x's unit class, singleton {x}. (For his rather technical discussion see his Chapter 2: 'The Trouble with Classes'.)

I myself suggested in an article that the unit-classes, the singletons, are states of affairs (Armstrong 1991b). The thought was this. The unit-class marks off its member as a *one*, something that can be specified, put in a class. But don't you need some answer to the question 'What sort of one?' Ought there not to be some property, however second-rate the property, to single out the singular object? So what we have is some entity with some property, and that is a monadic state of affairs. This suggestion ran into trouble, though. Gideon Rosen showed that linking classes and states of affairs in this simple way ran into very serious trouble, including paradoxes (Rosen 1995).

I now think however that I got into this trouble by not drawing the same distinction for set theory that I draw in my discussion of mathematical truths. Let us turn to a particular case that I hope may prove enlightening. Consider the world, the whole of being, that at an earlier point I called w. w has the structural property W, the most extensive property of all. The all-embracing state of affairs is *w is W*, and states of affairs are particulars.

Suppose, then, that we propose that a unit-class exists of which *w is W* is the only member: {*w is W*}. That is fine by a set theorist. There will also be singleton classes of this class, and so *ad infinitum*. But that is then trouble for the idea that all classes are states of affairs. This is because in a state of affairs, as I have developed the view, a property must attach to a particular *contingently*, not necessarily. But what property can attach *contingently* to *w is W*? Since w is everything, it embraces every actual property. So no contingent state of affairs is constructible! So I must deny existence to the singleton {*w is W*}. I have to argue that we can't get further than the state of affairs that *w is W*. Anything more is a

mere possibility and we have seen that mere possibilities are no ontological addition to reality. So I realized that I should have said, at best, that *some* and only some classes are states of affairs. Metaphysics rules. Set theory (or any other logical or mathematical system) does not rule in ontology. Just because, given *w is W*, one can have set-theoretically {*w is W*} should not make us think that the singleton class {*w is W*} can be added to the *ontology*.

The situation is really the same as in, say, considering the infinity of the natural numbers. It may be that the world is not big enough to instantiate such an infinite number, much less the higher infinities. It is worth looking here at an interesting protest made by the US philosopher Nelson Goodman, friend and collaborator with Quine, about set theory.

In his book *The Structure of Appearance* (1966) he makes an impassioned plea about classes:

Thus when one uses and is unable to dispense with variables taking classes as values, *one cannot disclaim the ontological commitment*. [My italics] Use of the calculus of classes, once we have admitted any individuals at all, [for Goodman 'individuals' are what there is] opens the door to all classes, classes of classes, etc., of those individuals, and so may import . . . an infinite multitude of other entities that are not individuals. Supposedly innocent machinery may in this way be responsible for more of the ontology than are the special frankly [sic] 'empirical' primitives.   (p.35)

I share Goodman's indignation with *a priori* metaphysics. But what we should do about it, I think, is to treat set theory as if it were a branch of mathematics, and then think of these disciplines as concerned with *possibility*. Some mathematical structures, though, and this includes classes, may not be instantiated. Ontology should be restricted to the instantiated

classes. Furthermore, the members of these classes should exist. The class of the Greek gods, for instance, should not be admitted into our ontology.

One other thing that I think we should ban from our ontology is the null class, said by set theorists to be included in every class. Even the set theorists seem to agree that this is the part of their formalism that does not have to be taken with ontological seriousness. Where would you put the null class? Can space-time enfold it?

Chapter 15

Time

The last two chapters take up two issues that deserve onto-logical attention. The *Presentist* theory of time, and also the *Growing Block* theory of time, take issue with the idea that the whole of time exists. Truthmaker arguments are not conclusive against these theories, but I think they make a strong case. This is argued in this chapter. The last chapter is about the mind. The mind is a remarkable phenomenon and it can be argued with some plausibility that it is something that my sort of metaphysics struggles with.

First we look at Presentism, the view that only the present exists. The obvious problem for Presentism is that of finding truthmakers for truths about the past or the future, which on this theory do not exist. The problem is made even harder by truths involving relations that hold between something that is present and something that is past or future ('Five years ago, I . . . ', 'Five minutes from now, I will . . .'). How can the Presentist provide truthmakers for such truths? Only, it would seem, by appealing to something in the present that has a necessary connection to what came before, or is to come. But what will these entities be? Whatever solution is found, either by denying that such truths need truthmakers, or by postulat-ing rather strange truthmakers, it would seem to be inferior to the omnitemporal theorist's position that the past and the pre-sent both exist and stand in temporal relations to the present.

Can it be said by a Presentist that there *was* a past and there *will be* a future? But the bite of the argument from truthmakers is that there seems to exist no truthmakers for the Presentist to appeal to. Can the Presentist reply that there *were* truthmakers for the past, and *will be* truthmakers in the future? But what truthmakers can be given for these tensed truths? The Presentist will have to modify truthmaker theory, making what is present the only *existent* truthmakers. This seems to me a very artificial modification. Suppose that *a* produces present *b* although *a* lies in the past. The causal relation here has two terms, only one of which exists. Perhaps the Presentist will be prepared to accept this consequence, but it is surely unattractive.

That is not the only difficulty that faces the Presentist. Presentists are faced with the scientific theory of Special Relativity, now of great respectability, which relativizes the present, making it relative to the inertial frames of observers. Some philosophers and some scientists still defend the notion of a non-relative present, but it is clear that Presentism is open to objections from the standard cosmological view.

A third difficulty, which may be an original argument, asks how long the duration of the present is. Ordinary language behaves likes a concertina, expanding and contracting at will. One can say 'Now in the Christian era . . .' or we can say with Iago taunting Desdemona's father 'Now, now, very now, an old black ram is tupping your white ewe'. What will the Presentists say? In all consistency, must they not contract the metaphysical present? Won't they have to contract it at least to what psychologists used to call 'the specious present'? But even in momentary experience there is still a past and a present to be distinguished. Must not the Presentist contract the present to the least moment of

time? Anything more seems arbitrary. But that will make the present a theoretical entity which none of us can experience, an ironic position for a theory that presumably wants to base itself on experience – experience of the present.

I am not saying that there cannot be truthmakers that the Presentist can suggest. All I contend for is that implausible and complex truthmakers will have to be postulated instead of the straightforward truthmakers that the omnitemporal theorist can give.

Besides these arguments, we can also, I think, explain away the appeal of Presentism. For all non-human animals the present (the short-ranging present) is overwhelmingly the most *important* thing in their lives. And even for humans it is pretty central. If you don't get to do something right in the present – crossing a crowded road say – then maybe you won't get anything right later. Present impulses overwhelmingly take precedence over the counsels of prudence, which is why prudence is so difficult. 'Living in the present' is natural to us. This genuine biological importance to us of the short-term present then gets translated, I suggest, into bad philosophy.

The Growing Block theory[1] is the view that the past, right up to the present, is real, but agrees with Presentism that the future does not exist. It seems to me to be a much better theory than Presentism. It also has its romantic side. As it were, the existential quantifier (existence) sweeps forward, continually creating new being, with the present the edge beyond which there is nothing. The present is just the growing edge of being. The view still has to face the objection from Special Relativity that the present is not

[1] In *Truth and Truthmakers* I used the unlovely term 'pastism'.

absolute. Michael Tooley (1997) faces up to this point, and argues that it is possible to defend an absolute account of the present compatible with Special Relativity.

His problem, though, is the future. He uses the truthmaker argument as one argument for the continuing reality of the past. But he does not seem to be troubled about the allegedly non-existent future, against which we can again employ the truthmaker argument. A Growing Block theorist could try John Heil's way out by saying that there will be truthmakers in the future for truths about the future. But if present *a* produces the future effect *b*, only the first term of the relation exists while the second term does not yet exist, although it will exist. Not a very satisfactory view, I think.

Those who think the future does not exist are, I think, misled by the huge cognitive gap there is between the past and the future. 'What's to come is still unsure' (Shakespeare). But it exists for all that. This does not entail Fatalism. The will exists and acts causally, and to the extent that what is willed comes to be as a result of its being willed, we are free.

I end this chapter by quoting an authority, a very distinguished one. Albert Einstein wrote to a friend: 'The past, present and future are only illusions even if stubborn ones.' (Quoted by Paul Davies in an article 'The Mysterious Flow', p.25.)

Chapter 16

Mind

I finish this little sketch of an ontology by considering briefly the ontology of mind. As a physicalist I originally thought, when young, that Gilbert Ryle's *Concept of Mind*, read as a sophisticated behaviourism, might do the trick for the mind. I was always troubled, though, by the apparent denial of introspection. Ayer's clever remark that a behaviourist must pretend to be anaesthetized struck home. I gave up on the Rylean view after hearing Jack Smart read his later famous paper 'Sensations and Brain Processes' on a visit to Melbourne where I was a lecturer at the time. Smart himself graduated from a Rylean position under the influence of U.T. Place who, in his pioneering 1956 paper 'Is Consciousness a Brain Process?', had answered yes to this great question.

As I see it the identity of the mind with brain, an identity I would like to uphold, faces three separate problems: consciousness, *qualia*, and intentionality. I feel confident that consciousness can be dealt with without too much trouble, but *qualia* – such things as colour, sound, taste, and smell – together with the problem of *intentionality* are difficult. I am (surprising myself a little) less confident of my views on these two problems than I am of most of the arguments of earlier chapters of this book!

Before taking on these three topics, let me first address those who think that it is obviously wrong that the mind is

simply our brain at work, operating very probably according to exactly the same laws of nature that are operating in the rest of space-time. When, using our introspective powers, we turn our attention to our own minds we find nothing that suggests that the mental processes we are monitoring are processes in the brain. Indeed, I think that many would have held, up to quite recently, that introspective evidence shows, perhaps conclusively, that the mind is *not* the brain. We can call this the Argument from Introspection. The brain may be the immediate cause that sustains the mind in its operations, upholders of this argument often concede, but it is not the mind itself.

I believe that there is a simple observation that explains why the anti-materialist position should seem attractive even while it may be false. Unfortunately, I had not noticed the point when I published my book *A Materialist Theory of the Mind* (1968a), so I was not able to include it in the book. But I did publish a little article in *Analysis* in 1968: 'The Headless Woman Illusion and the Defence of Materialism'. This illusion is brought about by exhibiting a woman (or, of course, a man!) against a totally black background with the head of the woman swathed with the same black material. It is apparently very striking, and could lead unsophisticated persons to think that the woman lacks a head. It is clear what is going on here. The spectators cannot see the head, and as a result make a transition to a strong impression that there was no head to see. An illegitimate operator shift is at work, taking people from *not* seeing the head to seeming to see that the woman did *not* have a head. The shift of the 'not', the operator, occurs because it is, in the circumstances, the natural and *normally effective* way to reason. If you can't see anybody in the room, you may conclude, very reasonably, there is

nobody in the room. In general you will be right. In the same way, we emphatically do not perceive introspectively that the mind is material process in our heads, so we have the impression that it is *not* material. This seems to nullify the force of the Argument from Introspection, while still explaining the seductiveness of that reasoning.

Consciousness. There are various understandings of this word, but here I am concerned with our unmediated access to (some) of our own mental processes. We have here an access (which of course can be erroneous even if direct) which each of us has to our own mind. A demystifying thought here is that each of us has perceptual access to goings on in our own *body* that nobody except ourselves has. One such route of such access is proprioception: the sense of our orientation, including motion, of one's limbs in space. In the same way, though more thoroughly private, we have access to our own minds. In Locke and Kant this becomes a doctrine of 'inner sense'. The most striking parallel with sense perception is that just as ordinary perception gives us up-to-the-moment information about what is going on in our environment, so 'introspective awareness' gives us up-to-the-moment information as to (some of) what is going on in our minds at that time. We even get a doubling-up, we can be aware that we are aware.

By the way, I do not think that the privacy of our own thoughts and experiences is a logical privacy. The privacy is contingent. We know that there are Siamese twins who have some portion of their bodies in common. It seems a possibility, though it is not clear whether it is an empirical possibility, that there could be twins that have a portion of their brain in common, and further can both introspect some of the mental processes in this common portion.

What is the biological importance of introspective awareness for our public conduct of our lives? I think it is of enormous importance for the solving of practical problems. We need first to draw a distinction in the mental realm that we readily draw in the bodily case. We easily distinguish between *acts* of ours, such as raising our hand, perhaps to vote, and our hand just going up, say because it gets entangled with a rope that pulls our hand up whether we will or no. In the first case, our will is active, in the second case something unwilled happens to our arm. The same sort of distinction is to be found in our mental life. Our thoughts can just drift without, as it were, us doing anything conscious to control the flow. But at other times we can be thinking, perhaps aiming to achieve some purpose in the world. That is mental *action*. (See Richard Taylor's *Action and Purpose*, 1966, for a very clear and useful discussion.)

Now if anything is needed in the carrying out of an action, at any rate any action that takes some time, it is *feedback*. Consider crossing a busy road and how much visual and other perceptual feedback is required to accomplish this. We may infer, then, that when we do actively do something in our mind, say adding up a column of figures, we are in continual need of mental feedback. I suggest that this is the biological reason we have introspective awareness. Without it we could not solve problems 'in our heads'. Without such feedback there could not be even the most primitive culture, still less civilization. We may note that at least the higher mammals – apes, elephants, the big cats – show signs, at times, of solving practical problems 'in their heads'. So perhaps they have some introspective capacities. The classic case here is Kohler's chimpanzee that was introduced to boxes to play with. At a certain point a banana was introduced too

high for the ape to get at on a single box. The chimp seemed puzzled, and sat down, apparently to think. Suddenly he acted, placed one box on another and found it easy to get the banana. One might speculate that an image came to him of one box on another and he recognized it as a solution to his problem (*The Mentality of Apes*, 1925).

Qualia. What Locke called secondary qualities, colour, sound, taste, smell, perhaps pain, itch, and so forth, notoriously pose a huge problem for scientific realism. They are clearly part of the manifest image of the world, as Wilfrid Sellars would have said. But can we accept them in the scientific image? We can accept light waves, sound waves, molecules that act on the taste and smell receptors, stimulation of pain receptors, and so on. There we can produce plausible enough theories. But part of what we started with, the secondary qualities, fits into the picture very badly.

The theory that I would like to uphold is that the secondary qualities are to be identified with the properties of objects as they begin to be revealed to us by the advance of scientific knowledge. Consider the blue surface of the mouse pad that I have beside my computer. It presents itself as a fairly uniform darkish blue surface with very small white specks in the pattern. I want to accept that the surface is for the most part blue. Perception presents us with the blueness as an objective property of something in the world and I think we should accept this, accept that the blue colour is in the world qualifying the pad. Science presents us with an apparently very different account involving light waves interacting with the fine structure of the physical surface of the pad reflecting light waves into my eyes. But I want to *identify* the colour surface with what the physicists tell us is going on there. It is a second identity theory alongside the identity of mental

processes with brain processes. (I first proposed this second identity theory in Chapter 12 of *A Materialist Theory of the Mind*, 1968a.)

If this identity is not accepted, then the ontological status of the secondary properties becomes very strange. They become at best properties that are *correlated* with certain physical goings on, as opposed to being identified with them. The laws involved fit in very badly with the structure of the other physical laws. They are, in a phrase that Jack Smart took from Herbert Feigl, *nomological danglers*. The laws that would be needed would dangle from the main structure of the physical laws in a thoroughly arbitrary and unprepossessing way. It is hard to believe that the world works this way. There are also difficulties that suggest that the secondary qualities are epiphenomenal, thus raising the problem about how we could know about their existence. The argument is that the following counterfactual proposition looks to be true: if these properties did not exist, the world would still work in the same way. The physical laws would ensure that our material brain would still work the same way, and so our experience would still be the same.

At the same time, the identity theory for the secondary qualities seems, as a matter of phenomenology, pretty incredible. All our experience seems to be contradicted when we are told that colour surfaces are really utterly different from what they appear to be. What we have in fact is light waves impacting upon a physical surface. The microstructure of the events that are going on are far too small to be captured by our vision. We are not aware of them. What is needed is some consideration that will make the suggested identity in some way plausible. We want an equivalent to the Headless Woman! I suggest that an Argument from Magnification may

help. We know that at a distance the detail of, say, some fine classical house, may not be apparent. The details merge to present something that is simpler in appearance. Only as we approach the house do the differences of parts of the structure appear. In much the same way we can get closer, as it were, to a uniformly coloured surface by looking at portions of it with a magnifying glass and then under successively more powerful microscopes. Our experience then is that more and more structure is revealed – it is no longer a uniform surface. We are handicapped in capturing the structure by the fact that human vision is only sensitive to light waves in a restricted band of the spectrum. But do we not have some evidence that what we are dealing with is microstructures quite unlike the surface presented to the eye in ordinary conditions? The rest of the secondary qualities are less precise than the qualities we are presented with in vision. But using the analogy of colour we can perhaps suppose that if there were equivalents of the magnifications that we can actually have in vision, then the other secondary qualities would break down in the same way that colour seems to do.

I am far from thinking my argument does anything to *prove* the identity of the secondary qualities with physically respectable properties. All I have wanted to do is to show how this identity can be given *some* epistemic respectability, *some* intuitive plausibility. The difficulty in fitting irreducible secondary qualities into our current physics in a plausible manner must be the main positive argument for reducibility. So I remain unimpressed by the case for irreducibility, for which, in our time, David Chalmers has so ably argued. See his book: *The Conscious Mind: In Search of a Fundamental Theory* (1996).

Intentionality. The last problem in the philosophy of mind that I will discuss is the intentionality of mental states. (The philosopher who first focused our attention on intentionality, using that word, was the Austrian Franz Brentano, 1838–1917. The English-speaking philosophical tradition was slow to come to terms with intentionality.) Certainly many mental states have this puzzling property, and for myself I incline to think that all mental states are intentional. (I have been influenced here, over many years, by the work of that leading philosopher of the mind, W.G. Lycan.) To possess intentionality, mental states must point to some object *but that object may not exist*. Beliefs are an obvious, non-controversial case because they may be false. In such a case, the 'thing believed' does not exist. A bit more controversially, I would argue that all perceptions are intentional. Of their own nature, they make a claim about reality, but the claim may be mistaken. Sensory illusion makes this clear, even when, using a more sophisticated part of our mind, we recognize that the presentations are illusions. This extends also, I think, to introspective claims. (Introspective claims don't have the indubitable nature that philosophers used to claim for them, perhaps influenced by Descartes.) In all these cases we have *informational* intentionality. But there is also intentionality present in intentions, purposes, desires (even if we are certain that the desired object is unattainable) and so on. The intentionality of mental states and processes is thus a very strange phenomenon. It is the mind somehow pointing out to the world (and including pointing inward to itself), but where it may be pointing wrong.

But if one is looking for a physicalist account of the mental, and so for a physicalist account of intentionality, I think we do well to notice the resemblance of intentionalities

to *dispositions*. I am not quite sure who first pointed this out, but I arrived at the idea on hearing a paper read by Dr John Burnheim many years ago in the Philosophy Department at Sydney University. Dispositions have *manifestations*. The brittle glass may manifest its disposition of brittleness by breaking rather easily. But, of course, it may never break, perhaps during its whole history. It might end by being melted down without breaking at any point. So manifestations of a disposition possessed by a certain object may or may not ever come into existence. That is why the fragile glass does not bear a *relation* to the manifestation. The manifestation may not occur, and the glass cannot be related to something that may never happen. But intentionality is like that too. If you have a false belief its content, say 'that it will rain today', may be perfectly clear. But you can't be *related* to that content because the belief is false. There is no rain. This suggests (without, of course, in any way proving) that intentionality may be some sort of cousin to dispositions, or even a peculiarly sophisticated disposition.

But how to develop this idea further is a problem! One presumably starts with simpler cases and then tries to work up. In my *A Materialist Theory of the Mind* I included a section in Chapter 11, not a very easy one, that I labelled 'The intentionality of perception'. The central idea, though, is not too difficult. I called it a *causal circuit*. Suppose that an organism is able to select between a certain range of colours. 'Select' here is behavioural. Suppose, that is, an object having one of the surface colours (blue, say) acts upon the organism that is then able to differentiate *in its conduct* (which could be 'conduct' within the mind, at least in the human case) between blueness and the other colours. Then it can be said to perceive blue *as blue*. That is primitive intentionality. All

this, of course, is routine in experiments to see whether organisms are capable of certain sensory discriminations. It is a *causal* circuit because the blue object acts causally on the subject that then has the capacity to act back in some way that differentiates the blue object from non-blue objects. Notice that the *closing* of the circuit need not occur. For instance, the organism may not be interested! (That is why experimenters include *rewards* for suitable discriminations.) All that is needed is the *capacity* for closing the circuit to occur (perhaps in suitable contexts). Notice also that the differentiation, if performed, can be seen as primitive *action*. Primitive intentionality is there in the action as much as in the perception.

That has not taken us very far. A sorting machine would be very near having that sort of intentionality. But I think we can see that complicating that sort of picture might begin to capture the intentionality of perception and even of action. But I can't see how to advance on this at all clearly. One can certainly agree with Saul Kripke that a causal chain from an object, event, etc. to the *naming* (or definite description?) of that object is going to be important, perhaps even essential, to it. But it is objects in our immediate environment, it would seem, that we ought to be considering first because that is what organisms can react to in the first place. The name 'Aristotle' (a case that Kripke called attention to) is harder because of the great distance in time. There is definitely a causal chain back to the great philosopher, but what else is there? Consider, again, the furthest reaches of intentionality, that is, the intentional objects of our most abstract and sophisticated utterances (including philosophical ones!), not to mention the plentiful supply of non-existent entities that we mention in our speech and our thoughts. I do not know

how to refute the claim that intentionality is an irreducible phenomenon, a phenomenon that is something different from the physical processes in the brain. So in my philosophy of mind I face difficulties from the alleged *qualia* and from the phenomenon of intentionality that seem rather greater than anything I am aware of in the rest of my ontological scheme.

Summing up. The following hypothesis has been argued for. The world is the space-time world. Its ultimate nature is a structure of contingent states of affairs (Russell's facts); and these states of affairs have as constituents particulars and universals, the latter monadic, dyadic, triadic, etc. with the details of this adicity determined empirically. The universals are linked (non-superveniently) by connections between states of affairs *types*. These constitute instantiations of the laws of nature. It seems necessary, further, to follow Russell again and recognize totality states of affairs that set limits to what there is, thus introducing negativity into the world, though I hope there is no need to accept absences, while providing truthmakers for truths that ostensibly refer to absences. Mathematical and logical and set-theoretical structures exist insofar as they are instantiated. If not, they are mere possibilities, and so (as I have argued) do not involve any addition of being.

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